

Set	Items	Description
S1	72401	S VERTEBRA? OR INTERVERTEBRA? OR SPINE? OR (CERVICAL? OR SACRAL? OR LUMBAR?) (2N)BONE? OR SPINOUS? OR SPINAL? OR INTERSPIN?
S2	69529	S OSTE? OR OSSO? OR OSTO? OR OSSE? OR ENDOSTE? OR PERIOSTE?
S3	129378	S BONE? ? OR ORTHOPED? OR ORTHOPAED? OR OSSEOUS? OR SKELET?
S4	13559	S OSTEAL OR OSTEOID OR OSSEO? OR OSTEOLOG? OR PERIOSTE??? OR OSSIF? OR FEMUR?
S5	29034	S TIBIA? OR MUSCULOSKELET? OR HUMER? OR FIBULA? OR KNEE? OR PATELLA?
S6	356960	S IMPLANT? OR PROSTHE? OR SHIM???? OR ENDOPROSTHE? OR INSERT? ?
S7	247800	S SPACER? OR EMPLANT? OR INFIX? OR REPLACEMENT? OR OSTEOSYNTHE?
S8	59624	S COVERPLAT? OR COVER()PLATE? OR SHIM????
S9	411746	S ARTIFICIAL? OR SYNTHETIC? OR MANMADE? OR WEDGE?
S10	31271	S S1:S5(20N)S6:S9
S11	27592	S TWO OR PAIR OR BOTH OR DOUBLE? OR TWIN?
S12	10056	S HALF OR HALVE? OR DUPLEX? OR TUPLE?
S13	29887	S 2 OR SIAMESE? OR SECOND? OR 2ND OR DUAD? OR BINARY OR TWOSOME?
S14	5094	S TANDEM? OR DUAL? OR BIFURCAT? OR TWOSOME? OR TWOFOLD?
S15	15659	S DUO OR COUPLE? OR COUPLING? OR MORE(2W)ONE
S16	7975	S COMPLEMENT? OR TONGUE?(2N)GROOV? OR CRENEL? OR CRENNEL?
S17	6227	S MUTUAL?(2N)ENGAG? OR MATE OR MATING OR MATED OR MALE(5N)FEMALE
S18	2059	S FORMFIT? OR DOVETAIL? OR INTERLOCK? OR MORTISE?(2N)TENON?
S19	15910	S INTERCONNECT? OR MESH? OR INTERACT? OR PARTNER? OR CONVEX?(5N)CONCAV?
S20	1632	S (GUID? OR NAVIGAT? OR SLIDE? OR LOCK? OR SLIDING? OR GLIDING?) (5N) (GROOV? OR CHANNEL? OR FURROW? OR TROUGH?)
S21	77	S (GUID? OR NAVIGAT? OR SLIDE? OR LOCK? OR SLIDING? OR GLIDING?) (5N) (ANNULUS? OR ANNULI? OR KERF? OR DADO? OR TRENCH?)
S22	1180	S (GUID? OR NAVIGAT? OR SLIDE? OR LOCK? OR SLIDING? OR GLIDING?) (5N) (GUTTER? OR CRATER? OR CHAMFER? OR SLOT?)
S23	2315	S UNDERCUT? OR UNDER() (CUT OR CUTS OR CUTTING) OR CUTIN? ? OR (CUT OR CUTS OR CUTTING) () IN
S24	23385	S ANGLE? OR ANGULAR? OR INCLIN? OR TAPER? OR POINT? OR ATTENUAT? OR CONVERG?
S25	9571	S SLANT? OR VECTOR? OR DECLIVIT? OR INTERSECT? OR (NON OR "NOT") () PARALLEL?
S26	5182	S UNPARALLEL? OR NONPARALLEL? OR ASYMPTOT? OR MEET??? OR (COME? OR CAME? OR COMING) () TOGETHER
S27	9846	S ARROW? OR SAGITT? OR NARROW? OR ACUMINAT?
S28	125	S AU=(KELLER A? OR KELLER, A?)
S29	125	S KELLER(2N) (ARNIE OR ARNOLD)
S30	8259	S IC=A61F?
S31	126	S S28:S29
S32	43	S S31 AND S10 AND S1:S5(5N)S6:S9 AND S16:S27
S33	39	S S32 AND S30
S34	43	S S32:S33
S35	20931	S S10 AND S1:S5(7N)S6:S9 AND S16:S27
S36	13020	S S35 AND S6:S9(7N)S11:S15
S37	3507	S S36 AND S6:S9(7N)S16:S23
S38	1683	S S37 AND S30
S39	3507	S S37:S38
S40	1998	S S39 AND S6:S9(7N)S24:S27
S41	1462	S S40 AND S1:S5(3N)S6:S9 AND S11:S15(3N)S6:S9 AND S6:S9(5N)S16:S23
S42	1301	S S41 AND S6:S9(5N)S24:S27
S43	720	S S42 AND S30
S44	1462	S S41:S43
S45	399	S S44 AND S1:S5/TI AND S6:S9/TI
S46	291	S S43 AND S45
S47	285	S S44 AND S20:S23(7N)S6:S9
S48	582	S S45:S47
S49	392	S S48 AND S11:S15(10N)S16:S23
S50	392	S S49 NOT S34
S51	313	S S50 AND AC=US/PR

S52	243	S S51 AND AY=(1970:2003)/PR
S53	227	S S51 NOT AY=(2004:2007)/PR
S54	243	S S52:S53
S55	79	S S50 NOT S51
S56	64	S S55 AND AY=1970:2003
S57	61	S S55 NOT AY=2004:2007
S58	307	S S54 OR S56:S57
S59	307	IDPAT (sorted in duplicate/non-duplicate order)
S60	304	IDPAT (primary/non-duplicate records only)

? show files

[File 348] **EUROPEAN PATENTS 1978-2007/ 200708**

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**File 348: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWSIPCR.*

[File 349] **PCT FULLTEXT 1979-2007/UB=20070308UT=20070301**

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**File 349: For important information about IPCR/8 and forthcoming changes to the IC= index, see HELP NEWSIPCR.*

60/3K/83 (Item 83 from file: 348) [Links](#)

EUROPEAN PATENTS

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00662672

Tibial component of a knee joint prosthesis

Tibiarteil einer Kniegelenkprothese

Element tibial d'une prothese de genou

Tibial component of a knee joint prosthesis

Tibiarteil einer Kniegelenkprothese

Element tibial d'une prothese de genou

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	Country	Number	Kind	Date	
Patent	EP	636352	A2	19950201	(Basic)
	EP	636352	A3	19950405	
	EP	636352	B1	20020123	
Application	EP	94201907		19940701	
Priorities	US	85714		19930701	

Designated States:

CH; DE; ES; FR; GB; IT; LI; SE;

Related Divisions: Patent (Application):EP 925767 (EP 99200964)

International Patent Class (V7): A61F-002/38; A61F-002/38Abstract ...A2

Abstract Word Count: 52

NOTE: 1

NOTE: Figure number on first page: 1

Type	Pub. Date	Kind	Text
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Publication: English

Procedural: English

Application: English

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF2	537
SPEC A	(English)	EPABF2	1738
CLAIMS B	(English)	200204	254
CLAIMS B	(German)	200204	300
CLAIMS B	(French)	200204	304
SPEC B	(English)	200204	1266
Total Word Count (Document A) 2275			
Total Word Count (Document B) 2124			
Total Word Count (All Documents) 4399			

Specification: ...A2

BACKGROUND OF THE INVENTION

This invention relates to a prosthetic device for replacing the proximal tibial surface of a knee joint. More particularly it relates to a means for attaching the components of a modular tibial prostheses to one another.

Modular tibial prostheses having a base plate and a separate articular surface component require a reliable means for... knee designs which can transmit significant tilting loads to the articular surface component through a spine.

SUMMARY OF THE INVENTION

The present invention addresses these requirements by providing in a modular tibial prosthesis including a base plate and an articular component an interlocking two -segment dovetail mechanism. The plate has an upwardly extending rail around its periphery which merges with an upwardly extending two-segment dovetail. This continuous rail strengthens the base plate by eliminating notches along the plate periphery. This configuration is accommodated by the two-segment configuration which allows a continuous rail while maintaining dovetail engagement posteriorly. The two-segment dovetail also minimizes the dimensions of the anterior dovetail segment to reduce the requisite dovetail groove in the articular component thereby yielding a stronger articular component. The dovetail segments incorporate compound angles which engage a two-segment, compound angle, dovetail groove in the underside of the articular component to wedge the articular component against the proximal surface and anterior rail of the tibial plate. This wedging action resists sliding and separation between the tibial components.

In a preferred embodiment, the dovetail mechanism cooperates with a posterior tongue and groove arrangement to further resist separation of the tibial components.

The two -segment dovetail also allows the alternative use of an articular component having a reinforced spine on the... portion contains a slot which avoids engagement between the rigid base portion and the anterior dovetail segment on the plate. However, the posterior dovetail segments of the articular surface and the plate still engage one another. The base portion... periphery of the top surface 2. Also extending upwardly from the plate 1 top surface 2 is a two-segment dovetail comprising first 4 and second 5 segments. The rail 3 merges with the second segment 5 to eliminate notches in... of the plate 1 that could weaken the plate 1. The first segment 4 includes converging sides defining a lead-in angle. The lead-in angle can vary from 1 to 179 degrees but is preferably about 32 degrees. The second segment 5 also includes converging sides defining a lead-in angle. However, the second segment 5 sides are offset outwardly with respect to the first segment... and are therefore not co-linear with the first segment 4 sides. The first and second dovetail segments blend at a shoulder 6 to form a continuous, two-segment dovetail. Preferably the lead-in angle of the second segment 5 is the same as the lead-in angle of the first segment 4. The two-segment dovetail allows the continuous rail while maintaining dovetail engagement posteriorly, due to the offset of the second segment 5. It simultaneously minimizes the dimensions of the first, anterior, dovetail segment 4 to reduce the requisite dovetail groove in the articular component. This results in a stronger articular component with improved resistance to material cold flow. The two-segment dovetail has a dovetail angle 7 which can vary from 1 to 89 degrees but preferably is about 45 degrees. In the preferred embodiment the dovetail angle 7 is the same for both the first 4 and second 5 segments. The preferred embodiment also contains a posterior groove 8, formed as an undercut in a widened portion 9 of the posterior part of the rail 3. The base... rail 3 to resist outward migration of the component when it is compressively loaded. A two-segment dovetail slot 14 corresponding to the two-segment dovetail is formed in the lower surface 12. The preferred embodiment includes a posterior tongue 15... aid in articulation with a femoral component and which is elastically deformable to allow the dovetail interface described below.

In use the articular surface component 10 is positioned with its lower surface 12 in contact with the top of the rail 3 and with the dovetail segments 4 and 5 in alignment with the two -segment dovetail slot 14 as shown in FIG. 6. With a downward and rearward force, the articular component 10 is urged into engagement with the plate 1. The two-segment dovetail slot engages the first segment 4 first and then the second segment 5 and the tongue 15 engages the groove 8. As the dovetail engages the dovetail slot, the slot elastically deforms creating reactive forces tending to move the articular component forward... the top 2 of the plate 1. These forces occur due to the lead-in angle and dovetail angle 7 respectively. These reactive forces are advantageously distributed over both dovetail segments 4 and 5. As the front edge 19 of the articular component 10 clears... 30 of the rigid base portion 26 fits over the first segment 4 of the dovetail and does not engage it. The second segment 5 does engage the dovetail slot 14 and the tongue 15 engages the groove 8. When the spined component 20... to the plate 1. The reinforcing component 22 in conjunction with the engagement of the second dovetail segment 5 with the dovetail slot 14 and the engagement of the tongue 15 and groove 8 provides secure fixation of the spined component 20 to the plate 1. This is...

Specification: ...B1

BACKGROUND OF THE INVENTION

This invention relates to a prosthetic device for replacing the proximal tibial surface of a knee joint. More particularly it relates to a means for attaching the components of a modular tibial prostheses to one another.

Modular tibial prostheses having a base plate and a separate articular surface component require a reliable means for... 613 discloses a tibial base plate and separate articular surface component attached by means of dovetail slots

in the base extending around the periphery of the base.

SUMMARY OF THE INVENTION

The present invention addresses these requirements by providing in a modular tibial prosthesis including a base plate and an articular component an interlocking two-segment dovetail mechanism. The plate has an upwardly extending rail around its periphery which merges with an upwardly extending two -segment dovetail. This continuous rail strengthens the base plate by eliminating notches along the plate periphery. This configuration is accommodated by the two-segment configuration which allows a continuous rail while maintaining dovetail engagement posteriorly. The two-segment dovetail also minimizes the dimensions of the anterior dovetail segment to reduce the requisite dovetail groove in the articular component thereby yielding a stronger articular component. The dovetail segments incorporate compound angles which engage a two-segment, compound angle, dovetail groove in the underside of the articular component to wedge the articular component against the proximal surface and anterior rail of the tibial plate. This wedging action resists sliding and separation between the tibial components.

In a preferred embodiment, the dovetail mechanism cooperates with a posterior tongue and groove arrangement to further resist separation of the tibial components.

The two -segment dovetail also allows the alternative use of an articular component having a reinforced spine on the... ..portion contains a slot which avoids engagement between the rigid base portion and the anterior dovetail segment on the plate. However, the posterior dovetail segments of the articular surface and the plate still engage one another. The base portion... ..periphery of the top surface 2. Also extending upwardly from the plate 1 top surface 2 is a two-segment dovetail comprising first and second 5 segments. The rail 3 merges with the second segment 5 to eliminate notches in... ..of the plate 1 that could weaken the plate 1. The first segment 4 includes converging sides defining a lead-in angle. The lead-in angle can vary from 1 to 179 degrees but is preferably about 32 degrees. The second segment 5 also includes converging sides defining a lead-in angle. However, the second segment 5 sides are offset outwardly with respect to the first segment... ..and are therefore not co-linear with the first segment 4 sides. The first and second dovetail segments blend at a shoulder 6 to form a continuous, two-segment dovetail. Preferably the lead-in angle of the second segment 5 is the same as the lead-in angle of the first segment 4. The two-segment dovetail allows the continuous rail while maintaining dovetail engagement posteriorly, due to the offset of the second segment 5. It simultaneously minimizes the dimensions of the first, anterior, dovetail segment 4 to reduce the requisite dovetail groove in the articular component. This results in a stronger articular component with improved resistance to material cold flow. The two-segment dovetail has a dovetail angle 7 which can vary from 1 to 89 degrees but preferably is about 45 degrees. In the preferred embodiment the dovetail angle 7 is the same for both the first 4 and second 5 segments. The preferred embodiment also contains a posterior groove 8, formed as an undercut in a widened portion 9 of the posterior part of the rail 3. The base...rail 3 to resist outward migration of the component when it is compressively loaded. A two-segment dovetail slot 14 corresponding to the two-segment dovetail is formed in the lower surface 12. The preferred embodiment includes a posterior tongue 15... ..aid in articulation with a femoral component and which is elastically deformable to allow the

dovetail interface described below.

In use the articular surface component 10 is positioned with its lower surface 12 in contact with the top of the rail 3 and with the dovetail segments 4 and 5 in alignment with the two -segment dovetail slot 14 as shown in FIG. 6. With a downward and rearward force, the articular component 10 is urged into engagement with the plate 1. The

two-segment dovetail slot engages the first segment 4 first and then the second segment 5 and the tongue 15 engages the groove 8. As the dovetail engages the dovetail slot, the slot elastically deforms creating reactive forces tending to move the articular component forward... ..the top 2 of the plate 1. These forces occur due to the lead-in angle and dovetail angle 7 respectively. These reactive forces are advantageously distributed over both dovetail segments 4 and 5. As the front edge 19 of the articular component 10 clears...

Claims: ...A2

1. An implant for the human knee comprising a tibial base plate having:

a generally planar top surface;

a first dovetail segment extending upwardly from the top surface and having converging sides; and

a second dovetail segment extending upwardly from the top surface and having converging sides, the converging sides of the second segment being offset outwardly with respect to the converging sides of the first segment such that the converging sides of the first segment are not collinear with the converging sides of the second segment.

2. The implant of claim 1 further comprising a rail extending above the top surface and extending substantially all the way around the top surface.

3. The implant of claim 2 wherein a portion of the rail is undercut to form a tongue receiving groove.

4. The implant of claim 3 further comprising a tibial articular surface having:

an upper surface for articulation with a femoral implant;

a lower surface for engagement with the tibial base plate, the lower surface having an outer edge shaped to fit within the rail, the lower surface further containing a dovetail groove shaped to receive the first and second dovetail segments; and

a tongue formed in a portion of the outer edge, the tongue shaped to fit within the tongue receiving groove.

5. The implant of claim 4 further comprising:

a spine extending upwardly from the upper surface, the spine containing a post hole, the post hole opening onto the lower surface;

a reinforcing component... ..hole, and a clearance slot formed in the bottom adapted to fit over the first dovetail segment without engaging the dovetail angle.

6. A prosthetic implant for the knee comprising:

a tibial base plate having a generally planar top surface;

a tibial articular surface component having an upper surface and a lower surface; a spine extending upwardly... ..the reinforcing component tightly against the base plate when the screw is tightened.

8. The implant of claim 6 further comprising a dovetail extending upwardly from the top surface of the base plate and wherein the base portion... the reinforcing component contains a clearance slot adapted to fit over a portion of the dovetail without engaging the dovetail when the post is placed in the post hole and the articular surface component is...

Claims: ...B1

1. An implant for the human knee comprising a tibial base plate (1) having dovetail segments characterised in that the plate (1) further comprises

a generally planar top surface (2);

a first dovetail segment (4) extending upwardly from the top surface (2), the segment (4) having converging sides, the converging sides forming a lead-in angle; and

a second dovetail segment (5) extending upwardly from the top surface, the second dovetail segment (5) having converging sides, the sides forming a lead-in angle, the converging sides of the second segment (5) being offset outwardly with respect to the converging sides of the first segment (4) such that the converging sides of the first segment (4) are not collinear with the converging sides of the second segment (5).

2. The implant of claim 1 further comprising a rail (3) extending above the top surface (2) and extending substantially all the way around the top surface (2).

3. The implant of claim 2 wherein a portion of the rail (3) is undercut to form a tongue receiving groove (8).

4. The implant of claim 3 further comprising a tibial articular surface (10) having:

an upper surface (11) for articulation with a femoral implant;

a lower surface (12) for engagement with the tibial base plate (1), the lower surface (12) having an outer edge (13) shaped to fit within the rail (3), the lower

surface (12) further containing a dovetail groove (14) shaped to receive the first and second dovetail segments (4, 5); and

a tongue (15) formed in a portion of the outer edge, the tongue (15) shaped to fit within the tongue receiving groove (8).

Claims: ...B1

60/3K/19 (Item 19 from file: 348) [Links](#)

EUROPEAN PATENTS

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01740691

Apparatus for achieving correct limb alignment in unicondylar knee arthroplasty

Vorrichtung zum Ausrichten des Beines für eine unikondylare Arthroplastie des Knies

Appareil pour réaliser la correction de l'alignement d'une jambe lors d'une arthroplastie unicondylienne du genou

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	Country	Number	Kind	Date	
Patent	EP	1424042	A2	20040602	(Basic)
	EP	1424042	A3	20040825	
	EP	1424042	A3	20040825	
Application	EP	2003257497		20031127	
Priorities	US	305697		20021127	

Designated States:

CH; DE; ES; FR; GB; IT; LI;

Extended Designated States:

AL; LT; LV; MK;

International Patent Class (V7): A61B-017/15 Abstract Word Count: 200

NOTE: 20

NOTE: Figure number on first page: 20

Type	Pub. Date	Kind	Text
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Publication: English

Procedural: English

Application: English

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200423	891
SPEC A	(English)	200423	7133
Total Word Count (Document A) 8024			
Total Word Count (Document B) 0			
Total Word Count (All Documents) 8024			

Specification: ...for achieving correct limb alignment and linking the distal femoral cut to the proximal tibial cut in unicondylar knee arthroplasty, including minimally invasive unicondylar knee arthroplasty. 2. Description of the Related Art.

Orthopedic procedures for the replacement of all, or a portion of, a patient's joint have been developed over the last thirty years. Currently, the procedures used to prepare the bone and seat the implants are generally referred to as open procedures. For the purposes of this discussion, the term... ..the appropriate compartment of the knee, including portions of the distal femur and the proximal tibia. The distal femur and proximal tibia of the affected compartment are also shaped to receive a unicondylar knee prosthesis.

In traditional unicondylar knee arthroplasty, leg alignment requires a trial and error technique in which the surgeon makes one... ..thereafter selects the location of the other of the distal femoral cut and the proximal tibial cut based on experience and the knowledge that tibial prostheses are available in a limited number of thicknesses. Typically, the proximal tibial cut is made so as to remove the least amount of the proximal tibia, while ensuring sufficient removal of diseased or otherwise undesirable bone. The remaining femoral cuts are made to complete shaping of the femur to receive a femoral prosthesis. After the femoral and tibial cuts are complete, the femoral prosthesis and the tibial prosthesis, or provisional versions thereof, are temporarily implanted and leg alignment is reviewed by the surgeon. If the tibial prosthesis does not include an integral bearing component, then a discrete bearing component is also implanted. To adjust leg alignment, the surgeon can replace the tibial prosthesis, or bearing component with an alternative tibial prosthesis, or bearing component having an increased or decreased thickness. The surgeon may also recut the femur and/or use a different femoral implant to achieve appropriate leg alignment. The surgeon can also remove more tibial bone stock and again use the previously used tibial prosthesis, or replace the previously used tibial prosthesis with a tibial prosthesis of a different thickness. This procedure of trial and error is conducted until the surgeon... ..art technique utilizes a spacing mechanism to extend the spacing in the compartment of the knee receiving the unicondylar knee prosthesis. In this prior art technique, the compartment spacing is extended until the surgeon is happy... ..The present invention provides a minimally invasive procedure for creating correct limb alignment in unicondylar knee arthroplasty. Depending on which compartment of the knee is receiving a prosthesis, either a medial, or a lateral parapatellar incision is made to expose the knee joint. The incision used in the method of the present invention is smaller than the... ..accommodate insertion of the headless securing devices therein. Each of the hole pairs of the tibial cut block correspond to a different implant thickness. The tibial cut block also includes a tibial cut slot through which the proximal tibial cut can be made. The tibial cut is attached to the tibia by positioning the headless securing devices

into the appropriate hole pair for the desired implant, and, after making the sagittal cut in the proximal tibia, the horizontal tibial cut is made through the tibial cut slot.

An advantage of the present invention is the ability to perform a unicondylar... ..a perspective view of the adjustable alignment block of Figures 6-12, with a minus 2 millimeter femoral spacer secured thereto;

Figures 15-17 are side, top, and end views, respectively of an alignment... ..27-27' of Figure 26;

Figure 28 is a side plan view of a minus 2 millimeter femoral spacer of the present invention;

Figure 29 is a top plan view thereof;

Figure 30 is... ..Figure 38 is a perspective view illustrating use of a reciprocating saw to make the sagittal cut in the relevant knee compartment; and

Figure 39 is a perspective view illustrating use of an... ..the knee and draw a second line down the center of the tibial shaft. The angle formed by these two lines represents the angle of deformity (for all) as illustrated in Figure 2.

Figure 2 schematically illustrates knee joint... ..femoral head 16' to the center of distal femur 18' at knee 24 forms an angle V with line 22' drawn down the center of the shaft of tibia 12'. This angle V represents the angle of varus deformity of knee joint 24. Figure I illustrates healthy knee joint 14. As... ..center of the shaft of tibia 12, representing a knee joint without deformity. If the angle of deformity V is 15 degrees or greater, the patient is likely not a candidate... ..accessible to allow for assessing the femoral head location which is used to determine the angle of deformity V as illustrated in Figure 2 and discussed above. At this point, anatomic landmarks may be utilized to identify the location of the femoral head. In one... ..can be positioned over the center of the femoral head to serve as a reference point. In one exemplary embodiment, the location of the femoral head is confirmed with an anterior... ..the joint capsule distal to the vastus medialis in line with incision 28 to a point that exposes the anterior margin of the femoral condyle as illustrated in Figure 4. The... ..slot 62. Spacer bevels 64 and spacer slot 62 are utilized in conjunction with minus 2 millimeter femoral spacer 56 as further described hereinbelow. Opposite femoral paddle 42, alignment tower boss 54 extends from... ..further includes tibial paddle groove 50 in which tibial paddle 44 is positioned. Tibial paddle groove 50 guides movement of tibial paddle 44 between the closed position of adjustable alignment block 38 illustrated... ..fully described hereinbelow.

If there is significant erosion of the femoral condyle, two millimeters less bone may be resected from the distal femoral condyle. In such a case, minus two millimeter distal femoral spacer 56 (Figures 28-31) will be positioned atop femoral paddle 42 of adjustable alignment block 38 as illustrated in Figure 14. With minus two millimeter distal femoral spacer 56 attached to femoral paddle 42 of adjustable alignment block 38, femoral cut slot 40 will be moved two millimeters distally with respect to distal femur 18' from the position illustrated in Figure 13, i.e., a position in which minus two millimeter distal femoral spacer 56 is not secured to femoral paddle 42 of adjustable alignment block 38. Therefore, two millimeters less femoral bone will be resected when an oscillating saw is positioned through femoral cut slot 40 when minus two millimeter distal femoral spacer is utilized.

Minus 2 millimeter femoral spacer 56 is illustrated in detail in Figures 28-31. As illustrated in Figure 28, minus 2 millimeter femoral spacer 56 has height H measuring 2 millimeters. With this in mind, with minus 2 millimeter femoral spacer 56 positioned atop femoral paddle 42 as illustrated in Figure 14, cut slot 40 will... ..along femur 18' relative to its position when adjustable alignment block 38 is positioned in knee joint 24 without minus 2

millimeter femoral spacer 56.

Femoral spacers of varying heights may be utilized in accordance with the present invention to adjust the depth of the distal femoral resection. Minus 2 millimeter femoral spacer 56 is illustrated in detail in Figures 28-31. As illustrated in Figure 31, femoral spacer 56 includes dovetails 84 extending from a lower surface thereof to effect securement of distal femoral spacer 56... As illustrated in Figure 11, femoral paddle 42 of adjustable alignment block 38 includes opposing spacer bevels 64 which facilitate expansion of dovetails 84 of minus 2 millimeter femoral spacer 56 to allow for positioning of minus 2 millimeter femoral spacer 56 atop femoral paddle 42. Furthermore, referring to Figures 29 and 30, minus 2 millimeter femoral spacer 56 includes a pair of expansion slots 58 facilitating outward expansion of dovetails 84 when securing minus 2 millimeter femoral spacer 56 to femoral paddle 42 of adjustable alignment block 38. When minus 2 millimeter femoral spacer 56 is secured to femoral paddle 42, adjustable alignment block protrusion 66 thereof fits within spacer slot 62 of femoral paddle 42 to prevent sliding of minus 2 millimeter femoral spacer 56 with respect to femoral paddle 42. To remove minus 2 millimeter femoral spacer 56 from femoral paddle 42, a pry bar is inserted therebetween to urge adjustable alignment block protrusion 66 out of spacer slot 62 of femoral paddle 42. Minus 2 millimeter femoral spacer 56 can then be slid from engagement with femoral paddle 42.

With adjustable alignment block 38 positioned with femoral paddle 42 (with or without minus two millimeter distal femoral spacer 56 secured thereto) positioned in the space created in the affected compartment as illustrated in... is connected to distal telescoping rod 90. Referring to Figure 27, ankle clamp 120 includes dovetail channel 122 sized to accommodate dovetail 94 (Figure 22) of distal telescoping rod 90. As illustrated in Figure 22, distal telescoping... rod 102 which is threadably engaged in ankle clamp retaining cylinder 104 and extends through dovetail 94. With dovetail 94 positioned in dovetail channel 122, ankle clamp retaining knob 98 is rotated to force an end of ankle clamp retaining rod 102 to extend from the bottom surface of dovetail 94 and create an interference fit between dovetail 94 and dovetail channel 122. Ankle clamp 120 may, in one exemplary embodiment, include a channel for accommodating the end of ankle clamp retaining rod 102 extending below dovetail 94.

With ankle clamp 120 temporarily secured to distal telescoping rod 90, spring arms 124... alignment tower 70 secured to adjustable alignment block 38, ankle clamp 120 is slid onto

dovetail 94 of distal telescoping rod 90 with ankle clamp retaining knob 98 tightened to temporarily... effected compartment of the knee, with the ankle clamp positioned above the ankle. At this point, spring arms 124 are moved against the biasing force of springs 126 into an open... medial and lateral malleoli. For the medial compartment arthroplasty disclosed herein, distal tip 106 should point to the second metatarsal. When distal tip 106 of distal telescoping rod 90 is properly... is now positioned in the desired alignment by moving the leg until targeting guide 110 points toward the center of the femoral head. Over correction should be avoided. It is preferable... to avoid over torquing and the consequent stripping of the bone stock. At this point alignment is verified, and, if unchanged, alignment tower 70, round alignment rod 100, square alignment... in Figure 34, the longitudinal axes of holes 142 and 146 form a three degree angle with resection slot 150, allowing for a three degree tibial slope. It is contemplated that... marked 10, 12, and 14. These hole pair designations correspond to the size of the tibial prosthetic implant, i.e., the tibial component and the bearing surface. While the exemplary embodiment includes hole pairs marked 8, 10, 12, and 14, it is contemplated that a tibial cut block in accordance with the present invention could include additional cut depths corresponding to tibial prostheses of alternative thicknesses. Initially, the headless screws protruding from tibia 12' are inserted through hole pair 142/142' corresponding to an 8 millimeter tibial articular... the middle being measured anterior to posterior, i.e., along a line contained in a sagittal plane.

After tibial cut block 140 is positioned over the headless tibial screws, the knee... cut block 140, then the incision may be lengthened. In one exemplary embodiment, a resection guide can be inserted through resection slot 150 to help verify that the chosen tibial resection will be adequate. If the resection... next hole pair as necessary.

Once tibial cut block 140 is properly positioned, with headless tibial screws 160 extending through a hole pair thereof, the tibia is resected to receive a tibial implant. When resecting the femur, a retractor can be inserted medially to protect the medial collateral ligament. As illustrated in Figure 38, the sagittal cut in tibial 12' can be made free hand. With the knee flexed, blade 152 of reciprocating... surface 158 is utilized as a guide to determine the anterior/posterior slope of the sagittal cut. Cutting to proximal surface 158 of tibial cut block 140 leaves approximately 3-4 millimeters of unresected bone of the sagittal cut. Tibial cut block 140 can be manually held in place against the bone during... above the hole pair that will be used for the horizontal cut when making the sagittal cut. For example, if the hole pair corresponding to an 8 millimeter cut, i.e... 140 even with the desired proximal resection level and provide a mechanical stop for the sagittal cut. Note that in the exemplary embodiment disclosed, this option is only available when an 8 millimeter or 10 millimeter implant cut depth is the desired horizontal resection level.

Figure 39 illustrates hemostat 162 clamped to lateral tibial headless pin 160 to secure tibial cut block 140 flush against tibia 12'. As illustrated... tibial cut block 140 to make the proximal tibial cut. When making the proximal tibial cut in this fashion, care should be taken to avoid undercutting tibial eminence 156. After the horizontal proximal tibial resection is complete, tibial cut block 140 and headless tibial screws 160 are removed. And, if the sagittal cut is unfinished, this cut is completed and the resected tibial bone fragment is removed... cut slot 40 of adjustable alignment box 38 can be utilized to complete shaping of femur 10'. Provisional femoral and tibial implants are now used to perform a trial reduction and final implants are subsequently seated.

In an alternative embodiment of the present invention, the tibial cuts can be first made by aligning the joint with the alignment apparatus described above...

Claims: ...paddle is moved to abut a proximal tibia, with said femoral paddle abutting a distal femur when said knee is positioned to correct limb alignment.

7. The apparatus of claim 6, further comprising:

a femoral spacer secured to said femoral paddle of said spacing means, said femoral spacer having a thickness extending toward the distal femur.

8. An apparatus for preparing a knee for receiving a knee prosthesis, comprising:

a femoral cut block having a femoral cut slot;

a tibial cut block having a tibial cut slot; and

means for linking said femoral cut slot and said tibial cut slot... moveable connected to said body, whereby said tibial paddle is moved to abut a proximal tibia, with said femoral paddle abutting a distal femur when said knee is positioned to correct limb alignment; and

a femoral spacer releasably secured to said femoral paddle, said femoral spacer having a thickness extending toward the distal femur when said femoral spacer is secured to said femoral paddle and said apparatus is operably

positioned to maintain the spacing in a knee compartment to correct limb alignment.

13. The apparatus of claim 12, wherein said femoral spacer includes a pair of opposing dovetails extending from a lower surface thereof to releasably secure said femoral spacer to said femoral paddle, said femoral spacer further includes an expansion channel extending the thickness of the femoral spacer and positioned intermediate said dovetails.

14. An alignment apparatus for correcting alignment of a leg, comprising:

a spacer for insertion into a compartment of a knee;

a tibial alignment rod connected to said spacer, said tibial alignment rod having a longitudinal axis;

an ankle clamp releasably connected to said tibial alignment rod; and

a femoral alignment rod connected to said spacer, said femoral alignment rod having a longitudinal axis, said longitudinal axis of said tibial alignment rod and said longitudinal axis of femoral alignment rod being one of collinear and... femoral alignment rod.

16. An alignment apparatus for correcting alignment of a leg, comprising:

a spacer for insertion into a compartment of a knee;

a tibial alignment rod connected to said spacer, said tibial alignment rod having a longitudinal axis;

a femoral alignment rod connected to said spacer, said femoral alignment rod having a longitudinal axis, said longitudinal axis of said tibial alignment rod and said longitudinal axis of femoral alignment rod being one of collinear and ...



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Hodorek et al.

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(54) **METHOD AND APPARATUS FOR
 ACHIEVING CORRECT LIMB ALIGNMENT
 IN UNICONDYLAR KNEE ARTHROPLASTY**

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(58) **Field of Classification Search** 606/53,
 606/54, 60, 86, 102; 128/898
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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,524,766 A	6/1985	Petersen	
4,566,448 A	1/1986	Rohr, Jr.	
4,574,794 A *	3/1986	Cooke et al.	606/88
4,646,729 A *	3/1987	Kenna et al.	606/88
4,738,253 A *	4/1988	Buechel et al.	606/80
4,825,857 A	5/1989	Kenna	
4,938,762 A	7/1990	Wehrli	
5,116,338 A	5/1992	Poggie et al.	

5,122,144 A	6/1992	Bert et al.
5,234,433 A	8/1993	Bert et al.
5,688,280 A	11/1997	Booth, Jr.
6,296,646 B1	10/2001	Williamson
6,478,799 B1	11/2002	Williamson
2002/0198530 A1	12/2002	Farling

FOREIGN PATENT DOCUMENTS

FR	2648699	12/1990
FR	2819168 A	7/2002

* cited by examiner

Primary Examiner—Eduardo C Robert

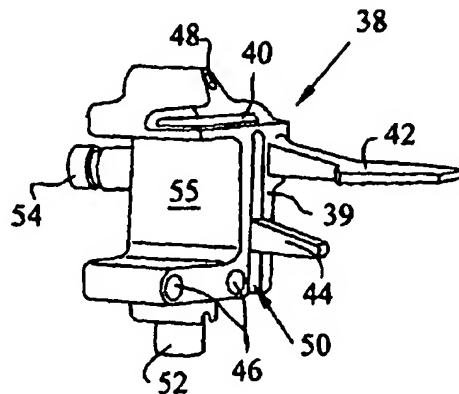
Assistant Examiner—John Kim

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 Baker & Daniels LLP

(57) **ABSTRACT**

A method and apparatus for correcting limb alignment in a unicondylar knee arthroplasty and linking the distal femoral cut and the proximal tibial cut. Alignment rods are connected to a spacing apparatus to facilitate correction of limb alignment. The alignment rods are positioned along the mechanical axis of the femur and the tibia and the knee joint is positioned to correct alignment. A spacing apparatus is positioned in the relevant knee compartment and utilized to hold the knee in position to correct limb alignment. The spacing apparatus includes a femoral cut slot through which the distal femoral cut is made and further includes tibial affixment apertures through which a headless securing device can be positioned to secure the spacing apparatus to the tibia. After the distal femoral resection is complete, the spacing apparatus is removed, with the headless securing devices remaining positioned in the tibia. The headless securing devices are used as a reference for securing a tibial cut block to the tibia for making the proximal tibial resection. With the mechanism of the present invention, the knee can be placed in flexion when making the proximal tibial cut and the distal femoral cut is linked to the proximal tibial cut.

16 Claims, 12 Drawing Sheets



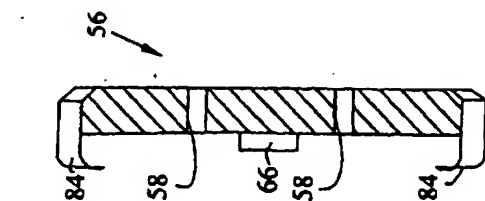


FIG. 31

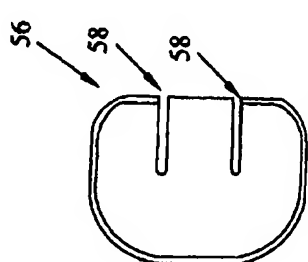


FIG. 29

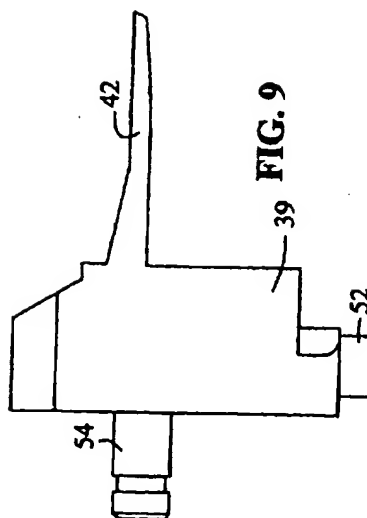


FIG. 9

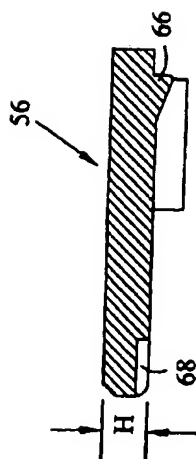


FIG. 28

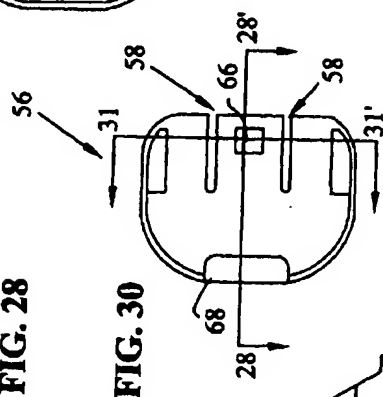


FIG. 30

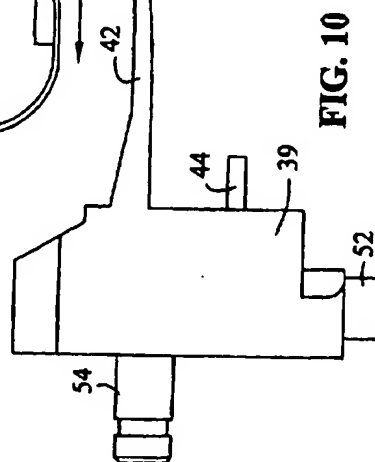


FIG. 10

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Adjustable alignment block 38 illustrated herein is a left medial/right lateral adjustable alignment block. An alternative alignment block can be utilized for a right medial unicondylar knee arthroplasty and a left lateral unicondylar knee arthroplasty. Such an alternative alignment block will be a mirror image of alignment block 38 illustrated herein. Referring to FIG. 12, the mirror image alignment block would include tibial affixment apertures 46 positioned to the left of tibial paddle actuation knob 52. Furthermore, in the alternative embodiment adjustable alignment block, femoral cut slot 40 would extend further to the left of tibial paddle actuation knob 52 from the perspective of FIG. 12.

If the joint is too tight to allow insertion of femoral paddle 42 of adjustable alignment block 38 into knee 24 as described above, additional anterior tibial bossing should be removed, as described with reference to FIG. 5, to create more space for inserting alignment block 38. Patellar osteofites can be removed for better exposure. Advantageously, the technique of the present invention does not require movement of the patella. Adjustable alignment block 38 will be used to hold the joint in proper alignment and will further be used as a resection guide when making the distal femoral cut as is fully described hereinbelow.

If there is significant erosion of the femoral condyle, two millimeters less bone may be resected from the distal femoral condyle. In such a case, minus two millimeter distal femoral spacer 56 (FIGS. 28-31) will be positioned atop femoral paddle 42 of adjustable alignment block 38 as illustrated in FIG. 14. With minus two millimeter distal femoral spacer 56 attached to femoral paddle 42 of adjustable alignment block 38, femoral cut slot 40 will be moved two millimeters distally with respect to distal femur 18' from the position illustrated in FIG. 13, i.e., a position in which minus two millimeter distal femoral spacer 56 is not secured to femoral paddle 42 of adjustable alignment block 38. Therefore, two millimeters less femoral bone will be resected when an oscillating saw is positioned through femoral cut slot 40 when minus two millimeter distal femoral spacer is utilized.

Minus 2 millimeter femoral spacer 56 is illustrated in detail in FIGS. 28-31. As illustrated in FIG. 28, minus 2 millimeter femoral spacer 56 has height H measuring 2 millimeters. With this in mind, with minus 2 millimeter femoral spacer 56 positioned atop femoral paddle 42 as illustrated in FIG. 14, cut slot 40 will be moved 2 millimeters distally along femur 18' relative to its position when adjustable alignment block 38 is positioned in knee joint 24 without minus 2 millimeter femoral spacer 56.

Femoral spacers of varying heights may be utilized in accordance with the present invention to adjust the depth of the distal femoral resection. Minus 2 millimeter femoral spacer 56 is illustrated in detail in FIGS. 28-31. As illustrated in FIG. 31, femoral spacer 56 includes dovetails 84 extending from a lower surface thereof to effect securement of distal femoral spacer 56 to femoral paddle 42 of adjustable alignment block 38. As illustrated in FIG. 11, femoral paddle 42 of adjustable alignment block 38 includes opposing spacer bevels 64 which facilitate expansion of dovetails 84 of minus 2 millimeter femoral spacer 56 to allow for positioning of minus 2 millimeter femoral spacer 56 atop femoral paddle 42. Furthermore, referring to FIGS. 29 and 30, minus 2 millimeter femoral spacer 56 includes a pair of expansion slots 58 facilitating outward expansion of dovetails 84 when securing minus 2 millimeter femoral spacer 56 to femoral paddle 42 of adjustable alignment block 38. When minus 2 millimeter femoral spacer 56 is secured to femoral paddle 42, adjustable alignment block protrusion 66

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thereof fits within spacer slot 62 of femoral paddle 42 to prevent sliding of minus 2 millimeter femoral spacer 56 with respect to femoral paddle 42. To remove minus 2 millimeter femoral spacer 56 from femoral paddle 42, a pry bar is inserted therebetween to urge adjustable alignment block protrusion 66 out of spacer slot 62 of femoral paddle 42. Minus 2 millimeter femoral spacer 56 can then be slid from engagement with femoral paddle 42.

With adjustable alignment block 38 positioned with femoral paddle 42 (with or without minus two millimeter distal femoral spacer 56 secured thereto) positioned in the space created in the affected compartment as illustrated in FIG. 13, alignment tower 70, which is illustrated in detail in FIGS. 15-18, is secured to adjustable alignment block 38 as illustrated in FIG. 19. Referring to FIG. 18, alignment tower 70 includes boss aperture 72 sized for placement of alignment tower boss 54 therein when alignment tower 70 is secured to adjustable alignment block 38. Alignment tower 70 further includes alignment protrusion 74 which abuts base 55 of adjustable alignment block 38 when alignment tower 70 is secured to adjustable alignment block 38. Alignment protrusion 74 is wedge shaped as illustrated in FIGS. 15 and 18. As alignment tower boss 54 of adjustable alignment block 38 traverses boss aperture 72 of alignment tower 70, alignment protrusion 74 contacts base 55 of adjustable alignment block 38 and, owing to its wedge shape, locks alignment tower 70 to adjustable alignment block 38. With alignment tower boss 54 positioned within boss aperture 72, and alignment protrusion 74 abutting base 55, alignment tower 70 is secured to adjustable alignment block 38 and will not rotate relative thereto. With adjustable alignment block 38 positioned as illustrated in FIGS. 13 and 19, and with alignment tower 70 secured thereto as illustrated in FIG. 19, alignment rod receiving end 76 of alignment tower 70 is located between the condyles of distal femur 18'.

The alignment device is now fully assembled as illustrated in FIG. 20. With adjustable alignment block 38 and alignment tower 70 positioned as illustrated in FIG. 19, first end 128 of square alignment rod 80 is inserted into square alignment rod aperture 78 (FIG. 15) of alignment tower 70 as illustrated in FIGS. 19 and 20. The opposite end of square alignment rod 80 is thereafter inserted into elongate square alignment rod aperture 92 (FIG. 24) of distal telescoping rod 90 (FIGS. 21-14) as illustrated in FIG. 20.

Prior to inserting square alignment rod 80 into elongate square alignment rod aperture 92 (FIG. 24) of distal telescoping rod 90, ankle clamp 120 (FIGS. 25-27) is connected to distal telescoping rod 90. Referring to FIG. 27, ankle clamp 120 includes dovetail channel 122 sized to accommodate dovetail 94 (FIG. 22) of distal telescoping rod 90. As illustrated in FIG. 22, distal telescoping rod 90 includes ankle clamp retaining knob 98 to temporarily secure ankle clamp 120 to distal telescoping rod 90. As illustrated in FIGS. 22-24, ankle clamp retaining knob 98 is secured to ankle clamp retaining rod 102 which is threadably engaged in ankle clamp retaining cylinder 104 and extends through dovetail 94. With dovetail 94 positioned in dovetail channel 122, ankle clamp retaining knob 98 is rotated to force an end of ankle clamp retaining rod 102 to extend from the bottom surface of dovetail 94 and create an interference fit between dovetail 94 and dovetail channel 122. Ankle clamp 120 may, in one exemplary embodiment, include a channel for accommodating the end of ankle clamp retaining rod 102 extending below dovetail 94.

With ankle clamp 120 temporarily secured to distal telescoping rod 90, spring arms 124 are opened against the

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EUROPEAN PATENTS

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01607523

Surgically implantable knee prosthesis having medially shifted tibial surface

Knieendoprothese mit medial versetzter Tibiaflache

Endoprothese du genou a surface tibiale deplacee medialement

Endoprothese du genou a surface tibiale deplacee medialement

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	Country	Number	Kind	Date	
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Application	EP	2003000744		20030113	
Priorities	US	44756		20020111	
	US	44224		20020111	
	US	44677		20020111	
	US	44159		20020111	

Designated States:

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Extended Designated States:

AL; LT; LV; MK; RO;

International Patent Class (V7): A61F-002/38; A61F-002/38Abstract Word Count: 84

NOTE: 4B

NOTE: Figure number on first page: 4B

Type	Pub. Date	Kind	Text
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Publication: English

Procedural: English

Application: English

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200329	1827
SPEC A	(English)	200329	10501
Total Word Count (Document A) 12328			
Total Word Count (Document B) 0			
Total Word Count (All Documents) 12328			

Specification: ...A1

The present invention pertains to **prosthetic devices**. More particularly, the invention pertains to **knee joint prostheses** which may be surgically implanted between the femoral condyle and tibial plateau of the knee joint.

Articular cartilage and meniscal cartilage provide the mobile weight bearing surfaces of the knee... ..to total knee arthroscopy (TKA). However, an HTO does leave a hard sclerotic region of bone which is difficult to penetrate making conversion to a total knee replacement (TKR) technically challenging. Unicompartmental and bicompartmental total knee replacements resect significant amounts of bone and, if performed on younger patients, will likely require revision surgery as they age. Revision total knee replacement surgery is usually extensive and results in predictably diminished mechanical life expectancy. Therefore, it is... ..materials and surgical technology required to accomplish this replacement task do not yet exist.

Currently, replacement of the existing ...with materials other than articular cartilage, is only possible with a total or uni-condylar knee replacement, and these procedures require removal of significant amounts of the underlying bone structure.

The alternative method is to fill the joint space with a **spacer** that replaces the missing articular materials. This **spacer** should also provide an anatomically correct bearing surface for both the tibial and femoral surface (U.S. Patent 6,206,927).

Attaching a new bearing surface to... ..plateau. Others include a series of polymeric materials such as PVA Hydrogels in a titanium **mesh** as described by Chang et al, "Historical Comparison of Tibial Articular Surfaces Against Rigid Materials And Artificial Articular Cartilage," Journal of Biomedical Material Research, 37, 51-59, 1997, biodegradable anhydride prepolymers that... ..within the joint while further being able to survive the mechanical loading conditions of the knee.

Therefore, what is needed is a uni-compartmental interpositional **spacer** which, by effectively replacing worn articular material, restores normal joint alignment without requiring any bone resection or any means of bone fixation and provides an anatomically correct bearing surface for the femoral condyle to articulate against.

According to one embodiment, an implantable knee prosthesis includes a body having a substantially elliptical shape in plan and a pair of opposed... ..the thickness of the peripheral edge at the second side, the first end and the second end.

According to another embodiment, the prosthesis includes a body having a substantially elliptical shape in plan

and a pair of opposed... ..a second shape different from the first shape; and the peripheral edge extending at an incline between the first face and the second face.

According to another embodiment, the prosthesis includes a body having a substantially elliptical shape in plan and including a first portion... ..from the first peripheral edge to form a shoulder between the first portion and the second portion.

According to another embodiment, the prosthesis comprises a two-piece body having a substantially elliptical shape in plan; a first piece being a tibial piece including a tibial surface; a second piece being a femoral piece including a femoral surface; the first piece and the second piece being mutually slidably engagable and separable.

The invention also relates to a method of providing a knee prosthesis comprising: providing a body having a substantially elliptical shape in plan and a pair of... ..second shape, different from the first shape; and providing a peripheral edge extending at an incline between the first face and the second face.

In another embodiment the method comprises the...surface; providing the second piece with a femoral surface; and the first piece and the second piece being mutually slidably engagable and separable.

Each of the above-mentioned embodiments is an independent aspect of the invention... ..following drawings, in which:

Fig. 1 is a plan view illustrating an embodiment of an implantable knee prosthesis.

Fig. 2 is a cross-sectional view taken along the line A-A of Fig.1.

Fig... ..several views of a further embodiment of the device.

Fig. 13 illustrates placement of the prosthesis in a knee joint.

The present device is an implantable knee prosthesis in the form of a uni-compartmental interpositional spacer which, by effectively replacing worn articular material, restores the normal joint alignment and provides a... ..collateral ligaments. By occupying the joint space and retensioning the collateral ligaments, the unicompartmental interpositional spacer improves joint stability and restores the limb to a more normal mechanical alignment.

An implantable knee prosthesis 100 is illustrated in Fig. 1. An anterior/posterior (A/P) cross-sectional view is... ..B and illustrated in Fig. 3. A Coordinate System Origin (CSO) 10 is at the intersection of lines A-A and B-B. Prosthesis 100, Figs. 1-3, includes a body 102 having a peripheral edge 112, a first or tibial face 104 and a second or femoral face 106.

The current mechanical structure is a... ..anatomy can generally be defined by one physical A/P measurement of the patient's tibial anatomy. The appropriate thickness of the implant can be determined by measuring the amount of joint space between the femoral and tibial surface when a minor amount of valgus (heels out, knees in) is applied to the...edge of the tibial plateau and femoral condyle but have significant cartilage remaining along the tibial spine. In these instances the tibial surface of the implant may be thicker along the medial edge to accommodate the defects on the tibial plateau and enhance the stability of the device. An implant made to these specifications would be more wedge-shaped when viewed in a frontal plane, with the medial side of the implant being... ..of a specific implant size can be enlarged while maintaining the geometric area of the tibial surface. This modification of the

implant would prevent overhang of the tibial surface beyond the border of the tibial plateau while providing a larger surface area to distribute the contact loads at the femoral... other instances, it may be preferable to decrease the femoral surface area for a given implant size.

Degeneration in the medial compartment will cause the femoral condyle to shift towards the medial edge of the tibia such that the center of the femur is no longer directly above the center of the tibia. In some patients it may be desirable to offset the femoral surface of the implant laterally with respect to the tibial geometry to put the femur back in a more normal alignment. Other degenerative conditions can exist which could be accommodated... fill in the space that results from cartilage loss on both the femoral condyle and tibial plateau. The thickness of the implant at the CSO should be approximately equal to the combined amount of cartilage loss from the two bony surfaces. When an implant of proper thickness is inserted between the femur and the tibia, the limb is restored to its proper anatomic alignment and ligament structures around the knee are retensioned.

As previously described, the implant is thicker at the posterior edge than at the CSO because it replicates the shape of the intact meniscus. In order for the implant to center itself on the surface of the tibia, the thick posterior edge of the device must be forced beyond the most distal aspect of the femur where the space between the femur and tibia is the smallest. Insertion of the implant is accomplished by forcing the medial compartment joint space open while lifting the tibia over the posterior edge of the implant. To make the insertion of the implant easier, the implant could be separated into a femoral portion and a tibial portion. The femoral portion could be positioned against the distal femur and then the tibial portion could be inserted into the knee separately. The two portions... between the articulation surfaces. The runner would preferably provide a slidable connection, such as a dovetail, between the two portions that would prevent them from separating.

For example, in the embodiments of Figs. 4a-4d, an implantable knee prosthesis is generally designated 400 and includes a body 402 having a substantially elliptical shape in... first portion A and a second portion B. The second portion B extends at an angle (α) relative to the first portion A. The additional thickness of T2 is thus medially shifted on the tibial face 404 to accommodate bone loss.

Prosthesis 400 as viewed in Fig. 4e, is similar to prosthesis 100, Fig. 1, in that a dimension D, in a range of from about .6A... to about .48A of the dimension F.

In another embodiment, Figs. 5a-5d disclose an implantable knee prosthesis generally designated 500 including a body 502 having a substantially elliptical shape in plan, and... body piece 524 includes the second face 508. The first face 504 is at an angle (α) relative to the second face 508.

The first body piece 522 may also have a keyed sliding interconnection with the second body piece 524. For example, a surface 526 of the first body piece 522 may... 4a-4d and 5a-5d, the convex surface of the first face includes a contour angle (discussed above) which is substantially the same as an associated contour angle of a tibial plateau. The concave surface of the second face includes a contour angle (discussed above) which is substantially the same as an associated femoral condyle. In this manner, the first and second faces are contoured such that the prosthesis is self-centering between a tibial plateau and a femoral condyle as discussed above.

In some patients, it may be beneficial to provide an

insert different tibial and femoral surface profiles. For example, in one of the embodiments of Figs. 6a-6d, an implantable knee prosthesis 600 comprises a body 602 having a generally elliptical shape in plan including a first... second face 606 includes a concave surface 614.

A peripheral edge 612 extends at an **incline** between the first face 604 and the second face 606. As a result, the second...associated contour of a femoral condyle. In this manner, the first face 604 and the second face 606 are contoured such that the **prosthesis 600** is self-centering between a tibial plateau and a femoral condyle as discussed above.

In another one of the embodiments of Figs. 7a-7d, an **implantable knee prosthesis 700** comprises a body 702 having a generally elliptical shape in plan including a first... ..second face 706 includes concave surface 714.

A peripheral edge 712 extends to form a **converging incline** between the first face 704 and the second face 706. As a result, the first... ..associated contour of a femoral condyle. In this manner, the first face 704 and the second face 706 are contoured such that the **prosthesis 700** is self-centering between a tibial plateau and a femoral condyle as discussed above.

In some patients, it may be beneficial to provide an **insert** which includes an enlarged femoral surface. For example, in one of the embodiments of Figs. 8a-8d, the **implantable knee prosthesis 800** comprises a body 802 having a generally elliptical shape in plan including a firstface 814. The second peripheral edge 812 extends radially outwardly, as indicated by a directional **arrow** designated R1, from the first peripheral edge 808 to form a shoulder 816 between the... ..associated contour of a femoral condyle. In this manner, the first face 810 and the second face 814 are contoured such that the **prosthesis 800** is self-centering between a tibial plateau and a femoral condyle as discussed above.

The second peripheral edge 812 extends between... ..be less than the second area A2.

In the embodiments of Figs. 9a-9d, an **implantable knee prosthesis 900** comprises a body 902 having a generally elliptical shape in plan including a first... ..face 914. The second peripheral edge 912 extends radially outwardly, as indicated by a directional **arrow** designated R2 from the first peripheral edge 908 to form a shoulder 916 between the... ..associated contour of a femoral condyle. In this manner, the first face 910 and the second face 914 are contoured such that the **prosthesis 900** is self-centering between a tibial plateau and a femoral condyle as discussed above.

The first portion 904 includes a first... ..second area A2.

For example, in one of the embodiments of Figures 10a-10d, an **implantable knee prosthesis 1000** comprises a **two-piece body 1002** having a generally elliptical shape in plan including a first piece 1004...second face 1014 includes a concave surface 1020. The first face 1010 includes a contour **angle** (discussed above) which is substantially the same as an associated contour **angle** of a tibial plateau. The second face 1014 includes a contour **angle** which is substantially the same as an associated contour **angle** of a femoral condyle. In this manner, the first face 1010 and the second face 1014 are contoured such that the **prosthesis 1000** is self-centering between a tibial plateau and a femoral condyle as discussed above.

The first piece 1004 is a tibial piece and includes a first flat interface 1023 having a linear **dovetail** shaped keyway 1022 formed therein. The **second piece 1006** is a femoral piece and includes a second flat interface 1024 for abutting with first interface 1023 and having a linear **dovetail** shaped key 1026 protruding therefrom, and sized for sliding engagement within keyway 1022. In this manner, the first piece 1004 and **second piece 1006** are mutually slidably engagable and separable. The linear key 1026 and the mating linear keyway 1022 permit the first and second pieces 1004, 1006, respectively, to be joined in a straight-line sliding motion.

Second piece 1006, of prosthesis 1000 as viewed in Fig. 10e, is similar to prosthesis 100, Fig. 1, in that... ..to about .48A of the dimension F.

In the embodiments of Fig. 11a-11d, an implantable knee prosthesis 1100 comprises a two-piece body 1102 having a generally elliptical shape in plan including a first piece 1104... ..second face 1114 includes a concave surface 1120. The first face 1110 includes a contour angle (discussed above) which is substantially the same as an associated contour angle of a tibial plateau. The second face 1114 includes a contour angle which is substantially the same as an associated contour angle of a femoral condyle. In this manner, the first face 1110 and the second face 1114 are contoured such that the prosthesis 1100 is self centering between a tibial plateau and a femoral condyle as discussed above.

The first piece 1104 is a tibial piece and includes a first concave interface 1123 having a concave dovetail shaped keyway 1122 formed therein. The second piece is a femoral piece and includes a second convex interface 1124 for abutting with first interface 1123 and having a convex dovetail shaped key 1126 protruding therefrom, and sized for sliding engagement within keyway 1122. In this manner, the first piece 1104 and second piece 1106 are mutually slidably engagable and separable. The concave keyway 1122 and, the convex key 1126 permit the first and second pieces 1104, 1106, respectively, to be joined in an arcuate scooping motion, i.e. the... ..the keyway 1122 in an arcuate motion.

In the embodiments of Figures 12a-12d, an implantable knee prosthesis 1200 comprises a two-piece body 1202 having a generally elliptical shape in plan including a first piece 1204... ..second face 1214 includes a concave surface 1220. The first face 1210 includes a contour angle (discussed above) which is substantially the same as an associated contour angle of a tibial plateau. The second face 1214 includes a contour angle which is substantially the same as an associated contour angle of a femoral condyle. In this manner, the first face 1210 and the second face 1214 are contoured such that the prosthesis 1200 is self centering between a tibial plateau and a femoral condyle as discussed above.

The first piece 1204 is a tibial piece and includes a first flat interface 1223 having a curved, or arcuate dovetail shaped keyway 1222 formed therein. The second piece 1206 is a femoral piece and includes a second flat interface 1224 for abutting with first interface 1223 and having a curved or arcuate dovetail shaped key 1226 protruding therefrom, and sized for sliding engagement within keyway 1222. In this manner, the first piece 1204 and second piece 1206 are mutually slidably engagable and separable. The curve of the key 1226 and the mating curve of the keyway 1222 permit the first and second pieces 1204, 1206, respectively, to be joined in an arcuate sweeping motion, i.e. the... ..rotated into the keyway 1222 in an arcuate motion.

An exemplary use of, for example, prosthesis 100 is illustrated in Fig. 13. Prosthesis 100 is positioned in a knee joint 1300 between a femur 1302, including the femoral condyles 1304, and a tibia 1306 including the tibial plateau 1308. The femur 1302 and tibia 1306 include interconnecting collateral ligaments 1310. The device 100 illustrates the position of the posterior end P, the... ..side M and the lateral side L when the device 100 is inserted in the knee joint 1300.

The prosthetic device of the subject invention is a unicompartmental device suitable for minimally invasive, surgical implantation without requiring bone resection. The device is positioned within a compartment in which a portion of the natural... ..replace the meniscus.

By the term "unicompartmental" is meant that each device is suitable for implantation into but one compartment defined by the space between a femoral condyle and its associated tibial plateau. In other words, the present device

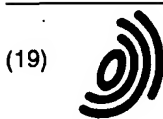
is not a "bicompartamental" device which, in one... ..generally the medial compartment, as the meniscus and associated articular surfaces in these compartments (left knee medial and right knee medial compartments) are most subject to wear and damage. However, it is possible to insert two separate devices into the medial and lateral compartments of the same knee, or to use two such devices that are mechanically but non-rigidly linked.

The present... ..device is devoid of means of physical attachment which limit its movement (for example, screws, mating ridges and depressions, porous areas to accommodate tissue regrowth, and the like).

The term "self... ..progressively "creep" toward one side of the compartment in which it is located. Rather, the angle of attack of the femoral condyle and/or tibial plateau bearing surfaces against the device... ..articulation, maintaining the device, on average, in the same location for any given degree of knee articulation. The centered, rest, position of the implant is usually determined when the knee is in extension and there is maximum contact between the femoral condyle and the device... ..device expected to have the most wear due to either greater movement relative to the mating surface (i.e., relative to the femoral condyle or tibial plateau) or high stress, may... ..structures are used. This method may be ideal for use in conjunction with cultured chondrocyte implantation (cartilage cells used as seeds) or osteochondral transplantation. Moreover, when the locus of damage to the articular cartilage or to a portion...may have been damaged or may experience tissue degeneration. The continued load experienced at such points and the wear experienced as the knee flexes will substantially hinder the regeneration of healthy... ..than the supporting material. Rather than deforming to distribute a load relatively equally on the mating surfaces, the device of the present invention functions as a rigid, substantially non-deforming, self... ..does not necessarily spread the load uniformly, but rather may concentrate the load upon desired

points, spanning areas of imperfection. If a soft and/or low modulus elastomer or thermoplastic is...along a constant axis of rotation (90 degrees to the axis of rotation), thus the angularity of the axis of symmetry of the femoral condyle relative to the axis of symmetry of the tibial plateau is not parallel but at some acute angle. Also, the axis of symmetry of the tibial plateau is not parallel to the path of rotation of the tibia relative to the femur but also at some mildly acute angle. Thus, the true orientation of the device, regardless of the relative orientations of symmetry of... ..the knee substantially extended. The outer contours of the device are therefore designed to substantially mate with the corresponding tibial and femoral surfaces when the knee is in full extension so... ..on the surface of the tibial plateau in extension.

As the knee is flexed, the mating along the tibial surface is substantially maintained. However, the contoured mating surfaces of the femoral condyle and femoral surfaces of the present device can become increasingly... ..rotation and posterior translation of the femur with respect to the tibia. Thus, the contour angle of the femur becomes more in-line with the contour angle of the tibia in flexion. This can cause relative lateral or rotational movement, in the... ..different geometry creates a rotational moment, in the tibial plane, which is resisted along the mating tibial surfaces and which also results in a restoring force tending to correctly locate the... ..the A/P midline, thereby reducing the mismatch between the two axes in flexion. This angle is preferably 0(degree) and can range from +/- 10(degree). Anterior to the midline, the... ..that is tangent to the posterior section of the sweep plane at the most distal point of the femoral A/P radius RA. This femoral surface geometry is essentially a compromise... ..symmetry.



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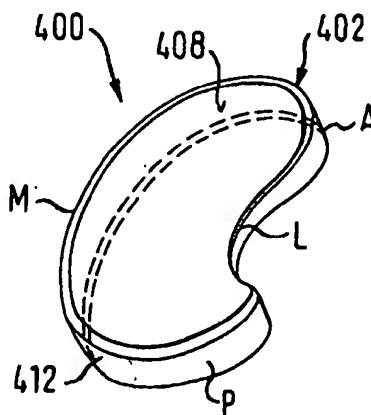
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(54) **Surgically implantable knee prosthesis having medially shifted tibial surface**

(57) An implantable knee prosthesis includes a body having a substantially elliptical shape in plan and a pair of opposed faces. A peripheral edge of variable thickness extends between the faces and includes a first

side, a second side opposite the first side, a first end and a second end opposite the first end. The thickness of the peripheral edge at the first side is greater than the thickness of the peripheral edge at the second side, the first end and the second end.

Fig. 4b



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Fig. 10a

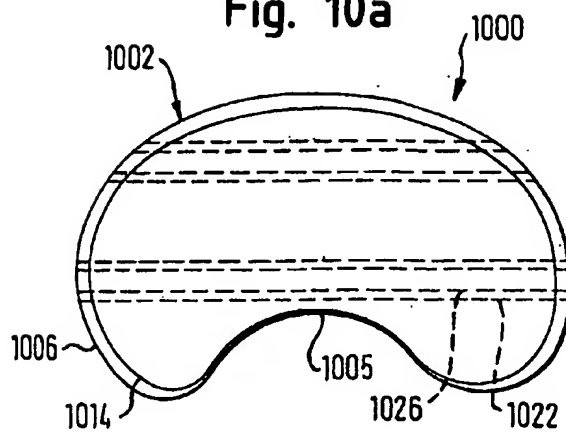


Fig. 10b

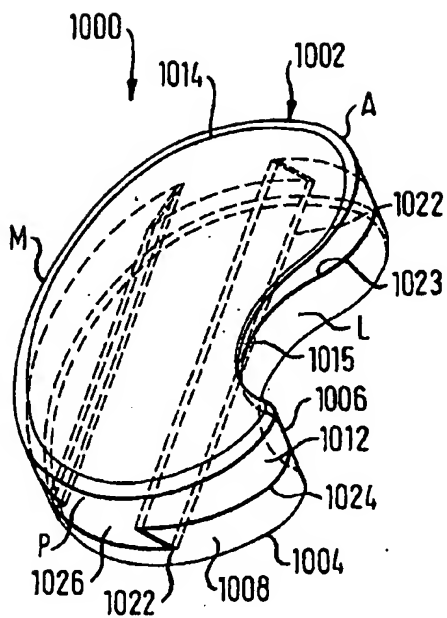


Fig. 10c

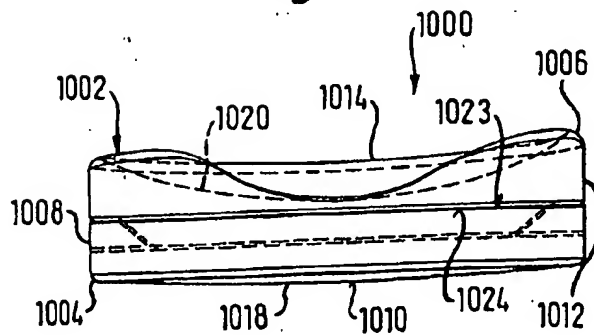
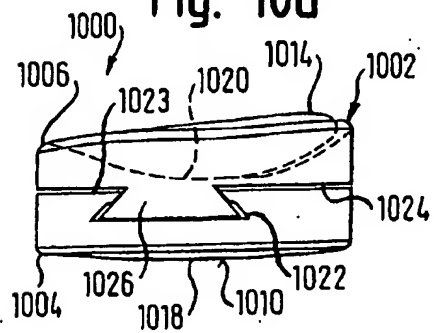


Fig. 10d



60/3K/62 (Item 62 from file: 348) [Links](#)

EUROPEAN PATENTS

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00968512

Tibial component of a knee prosthesis

Tibiateil einer Kniegelenkprothese

Element tibial d'une prothese du genou

Element tibial d'une prothese du genou

Patent Assignee:

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(applicant designated states: AT;BE;CH;CY;DE;DK;ES;FI;FR;GB;GR;IE;IT;LI;LU;MC;NL;PT;SE)

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	Country	Number	Kind	Date	
Patent	EP	878177	A2	19981118	(Basic)
	EP	878177	A3	19990203	
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Priorities	US	854827		19970512	

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International Patent Class (V7): A61F-002/38; ; ; A61F-002/38Abstract Word Count: 86

Type	Pub. Date	Kind	Text
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Application: English

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9847	1264
SPEC A	(English)	9847	3531
Total Word Count (Document A) 4795			
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Specification: ...engaged by the shoulder screw which is placed through the screw receiving holes of the insert and the base plate and engaged by threads in the base plate. The tibial prosthesis is assembled by inserting the stabilizer support into the hollow stabilizer of the insert (typically a preassembled subassembly) so that the hole in the support aligns with the hole... ..engages the stop on the rail, inserting the shouldered screw through the holes in the insert and the support, and threading the screw into the threads in the base plate.

The tibial prostheses according to the invention may be made in a variety of sizes and thicknesses and stabilizer tibial insert) according to the invention;

Figure 8 is a perspective view of the lower or distal... ..17 is a broken perspective view of the upper or proximal end of an assembled tibial prosthesis according to the invention;

Figure 18 is a perspective view of the lower or distal end of the tibial prosthesis of Figure 17;

Figure 19 is a top plan view of the tibial prosthesis of Figure 17;

Figure 20 is a bottom plan view of the tibial prosthesis of Figure 17;

Figure 21 is a posterior side elevation view of the tibial prosthesis of Figure 17;and

Figure 22 is medial (or lateral) side elevation view of the tibial prosthesis of Figure 17.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to Figures 1 through 6, a tibial base plate or support member 10, according to the invention, generally includes a top or... ..and, as will be described in more detail below, forms the first part of a dovetail coupling. The rail 16 is provided with a posterior upstanding stop 18 and a posteriorly angled (approximately $121/2$) anterior counterbored screw hole 20. Preferably, the stem 14 is angled posteriorly (approximately $31/2$) and is buttressed by posteriorly angled (approximately $251/2$) fins 22, 24. The support member 10 is preferably made of a cobalt chrome (Vitalium) alloy.

Turning now to Figures 7 through 12, a stabilizer tibial insert (bearing support member) 30 is a symmetrical plastic (UHMWPE) member having two upper or proximal... ..best in Figures 7, 8, and 11, the lower or distal surface 40 of the insert 30 is substantially bisected by a distally tapered groove 42 which is dimensioned to mate with the proximally flared rail 16 of the base plate 10 described above, and which forms the second part of a dovetail coupling. A posterior portion of the groove 42 is provided with a stop receiving slot 44... ..a posterior upstanding portion 54. The base portion 52 is provided with a shouldered posteriorly angled (approximately $121/2$) anterior screw hole 56. The base portion 52 is dimensioned to fit... ..17-22, those skilled in the art will appreciate that the aforescribed components (baseplate 10, insert 30, and support 50) are easily assembled to form a tibial prosthesis 100 which is shown in Figures 17-22. As seen best in Figures 17 and...portion 20a which receives the shoulder of the screw 60, and a lower or distal narrow threaded portion 20b which receives and engages the threaded portion of the screw 60. As... ..stem 14.

From the foregoing, those skilled in the art will appreciate that the central dovetail coupling of the insert 30 to the baseplate 10 will provide excellent torsional as well as vertical retention of... ..deformation of the insert as is required in many of the prior art devices. The coupling of the insert to the base plate also does not interfere with

the thickness of the bearing portions of the insert.

As mentioned above, the tibial prosthesis of the invention may be made in several different sizes. According to one exemplary embodiment... of the stop 18 is approximately .286 inches relative to the supporting surface 12. The angle of the flare in the rail 16 is preferably approximately $60\frac{1}{2}$. The stem 14... According to the exemplary embodiment, the thickness of the bearing portions 32, 34 of the insert 30 (at pre-established gauge points) will range from approximately .430 inches to approximately .247 inches. In this embodiment, the overall... diameter of approximately .239 inches.

There have been described and illustrated herein components of a tibial prosthesis and an assembled tibial prosthesis. While particular embodiments of the invention have been described, it is not intended that the... been disclosed, it will be appreciated that other dimensions could be utilized. Also, while particular angles have been shown, it will be recognized that other angles could be used with similar results obtained. Moreover, while particular configurations have been disclosed in...



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United States Patent [19]
Williams[11] **Patent Number:** **5,824,103**[45] **Date of Patent:** **Oct. 20, 1998**[54] **TIBIAL PROSTHESIS**[75] **Inventor:** **Welcome H. Williams, Wayne, N.J.**[73] **Assignee:** **Howmedica Inc.**[21] **Appl. No.:** **854,827**[22] **Filed:** **May 12, 1997**[51] **Int. Cl.⁶** **A61F 2/38**[52] **U.S. Cl.** **623/20**[58] **Field of Search** **623/20**[56] **References Cited****U.S. PATENT DOCUMENTS**

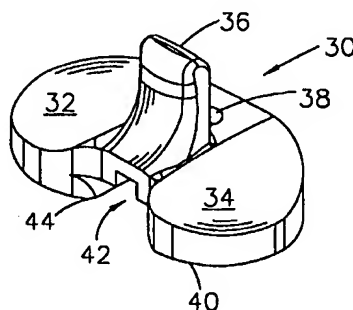
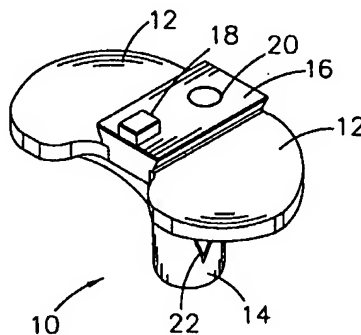
4,257,129	3/1981	Volz	623/20
4,550,448	11/1985	Kenna	623/16
4,653,488	3/1987	Kenna et al.	128/92 VW
4,834,756	5/1989	Kenna	623/16
4,963,152	10/1990	Hofmann et al.	623/18
5,007,933	4/1991	Sidebotham	623/20
5,035,700	7/1991	Kenna	606/88
5,192,324	3/1993	Kenna	623/16
5,194,066	3/1993	Vanzile	623/20
5,358,527	10/1994	Forte	623/20
5,370,699	12/1994	Hood	623/20
5,395,401	3/1995	Bahler	623/20
5,405,396	4/1995	Heldreth	623/20
5,609,639	3/1997	Walker	623/20
5,702,466	12/1997	Pappas	623/20

OTHER PUBLICATIONS

Brochure entitled "Duracon The Tibial System", published by Howmedica, Inc., Rutherford, New Jersey, pp. 1-15, Dec. 1994.

Primary Examiner—Michael J. Milano*Attorney, Agent, or Firm*—Joseph J. Kaliko[57] **ABSTRACT**

A tibial prosthesis includes a base support member, a bearing surface member, a stabilizer insert support, and a shoulder screw. The base member has a centrally located proximally flared protrusion or rail which extends substantially from the anterior edge of the base support member to the posterior edge of the base support member and defines a pair of substantially parallel dovetail coupling edges. An upstanding posterior stop is located on the upper surface of the rail adjacent its posterior edge and a posteriorly angled screw hole is provided in an anterior portion of the rail. The bearing member has a lower distally tapered recess or groove, dimensioned to receive the rail on the base member, and a posterior stop receiving recess for permitting the posterior stop on the base member rail to engage the insert support. A hollow upstanding stabilizer is formed on a central portion of the bearing member and a hole is provided anterior of the stabilizer. The stabilizer insert support is generally L-shaped and dimensioned to fit inside the hollow stabilizer portion of the bearing member. The base of the stabilizer insert is provided with a counterbored hole to be engaged by the shoulder screw which is placed through the screw receiving holes of the bearing member and the base member and engaged by threads in the base member.

23 Claims, 7 Drawing Sheets

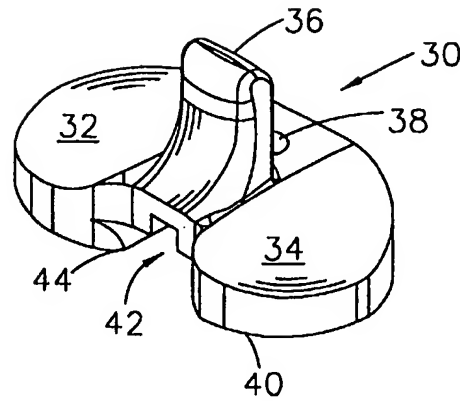


FIG. 7

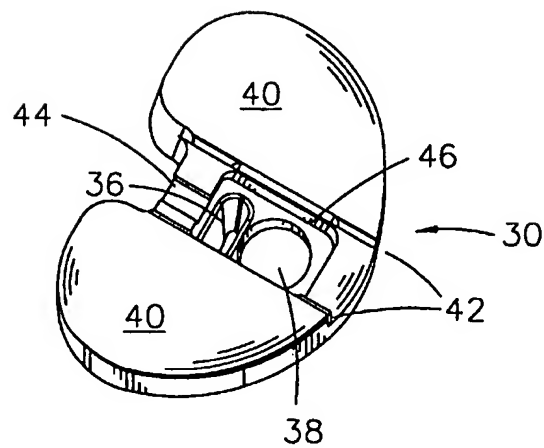


FIG. 8

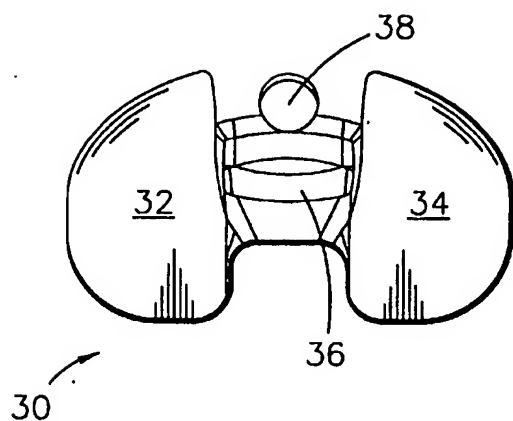


FIG. 9

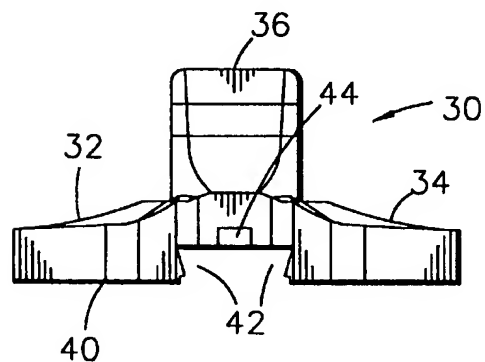


FIG. 11

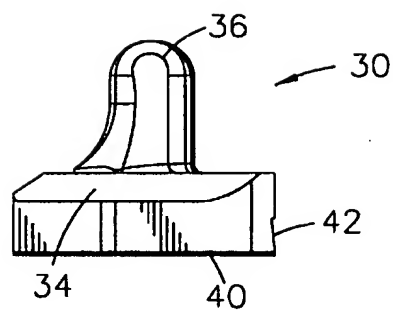


FIG. 12

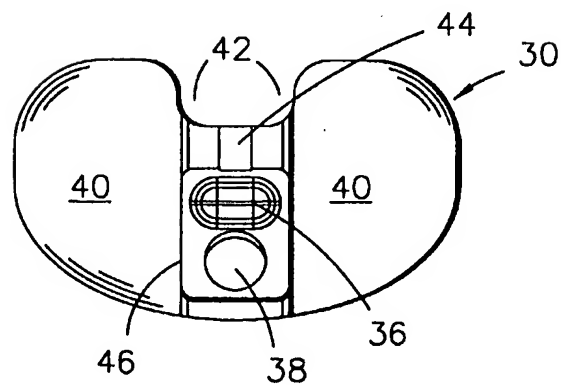


FIG. 10.

FIG. 20 is a bottom plan view of the tibial prosthesis of FIG. 17;

FIG. 21 is a posterior side elevation view of the tibial prosthesis of FIG. 17; and

FIG. 22 is medial (or lateral) side elevation view of the tibial prosthesis of FIG. 17.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIGS. 1 through 6, a tibial base plate or support member 10, according to the invention, generally includes a top or proximal symmetrical supporting surface 12 and a lower or distal mounting stem 14. The upper surface 12 is substantially bisected by a proximally flared protrusion or rail 16 which extends substantially the entire anterior-posterior width of the base plate and, as will be described in more detail below, forms the first part of a dovetail coupling. The rail 16 is provided with a posterior upstanding stop 18 and a posteriorly angled (approximately 12½) anterior counterbored screw hole 20. Preferably, the stem 14 is angled posteriorly (approximately 3½) and is buttressed by posteriorly angled (approximately 25½) fins 22, 24. The support member 10 is preferably made of a cobalt chrome (Vitalium) alloy.

Turning now to FIGS. 7 through 12, a stabilizer tibial insert (bearing support member) 30 is a symmetrical plastic (UHMWPE) member having two upper or proximal bearing support surfaces 32, 34 which conform to the distal condyles of a femoral member (not shown), and a centrally located upstanding hollow stabilizer 36 which is dimensioned to serve as a substitute for the posterior cruciate ligament. A screw receiving hole is provided anterior of the stabilizer 36. As seen best in FIGS. 7, 8, and 11, the lower or distal surface 40 of the insert 30 is substantially bisected by a distally tapered groove 42 which is dimensioned to mate with the proximally flared rail 16 of the base plate 10 described above, and which forms the second part of a dovetail coupling. A posterior portion of the groove 42 is provided with a stop receiving slot 44 which allows the insert 30 to pass over the stop 18 on the baseplate 10 (FIG. 1) as will be described in more detail below. In addition, an insert support receiving well 46 is provided in an area of the groove 42 surrounding the lower hollow access to the stabilizer 36 and the screw hole 38. As will be described in more detail below, this well 46 is dimensioned to receive the base portion of the metallic stabilizer support member.

As mentioned above, the stabilizer insert 30 is intended to be used with a metallic (preferably cobalt chrome alloy) support member. FIGS. 13-16 illustrate a support member 50 according to the invention. The support member 50 is substantially L-shaped having a base portion 52 and a posterior upstanding portion 54. The base portion 52 is provided with a shouldered posteriorly angled (approximately 12½) anterior screw hole 56. The base portion 52 is dimensioned to fit within the well 46 of the insert 30 (FIG. 8) with the upstanding portion 54 extending into the hollow stabilizer 36 and the hole 56 aligned with the hole 38.

From the foregoing, and with reference to FIGS. 17-22, those skilled in the art will appreciate that the aforescribed components (baseplate 10, insert 30, and support 50) are easily assembled to form a tibial prosthesis 100 which is shown in FIGS. 17-22. As seen best in FIGS. 17 and 22, the first step in the assembly is to place the upstanding portion 54 of the support 50 into the hollow stabilizer 36 of the insert 30 so that the base portion 52 of the support 50 is received

in the well 46 of the insert 30 and the hole 56 in the support 50 aligns with the hole 38 in the insert 30. The subassembly resulting from the first step in the assembly process being described is generally made available as a preassembly.

Next, as seen best in FIGS. 17 and 21, the insert 30, carrying the support 50, is positioned so that its posterior end faces the anterior end of the baseplate 10 and the groove 42 in the insert 30 is aligned with the rail 16 on the baseplate 10. The insert 30 is pushed posteriorly so that the rail 16 is embraced by the groove 42 and the base portion 52 of the support 50 abuts the stop 18 on the baseplate rail 16. The stop 18 prevents further posterior movement of the insert 30 and stops the insert 30 at a location where the hole 38 in the insert and the hole 56 in the support 50 are aligned with the hole 20 in the baseplate 10. With the components 10, 30, and 50 so arranged, a hexagon socket head shoulder screw 60 is inserted into the holes 38, 56, 20 and is screwed into threaded engagement with the baseplate 10. As seen best in FIGS. 17 and 22, the hole 20 in the baseplate 10 has a broad unthreaded upper or proximal portion 20a which receives the shoulder of the screw 60, and a lower or distal narrow threaded portion 20b which receives and engages the threaded portion of the screw 60. As shown in the Figures, the stem 14 of the baseplate 10 is provided with a threaded stem cap 70. This cap may be removed so that a stem extension can be added to stem 14.

From the foregoing, those skilled in the art will appreciate that the central dovetail coupling of the insert 30 to the baseplate 10 will provide excellent torsional as well as vertical retention of the insert. The use of the shoulder screw 60, rather than a conventional socket head screw, provides an added benefit that, in addition to anterior-posterior retention of the insert, the screw is highly resistant to posteriorly applied shear loading. The increased resistance to shear loading is achieved by the larger diameter shoulder portion of the screw 60 and the lack of stress risers which are found in conventional screws due to their thread configuration. Furthermore, the prosthesis 100 is very easy to assemble and does not require very careful positioning of the components at the time of the assembly. Assembly does not require deformation of the insert as is required in many of the prior art devices. The coupling of the insert to the base plate also does not interfere with the thickness of the bearing portions of the insert.

As mentioned above, the tibial prosthesis of the invention may be made in several different sizes. According to one exemplary embodiment, the baseplate 10 has a medial-lateral width of approximately 2.44 inches and an anterior-posterior width of approximately 1.44 inches. In this embodiment, the thickness of the base plate at the supporting surface 12 is approximately 0.117 inches, the height of the rail 16 is approximately 0.173 inches, and the height of the stop 18 is approximately 0.286 inches relative to the supporting surface 12. The angle of the flare in the rail 16 is preferably approximately 60½. The stem 14 is approximately 1.18 inches long and has an outer diameter of approximately 0.525 inches. The insert 30 will have corresponding dimensions to fit on the baseplate 10. According to the exemplary embodiment, the thickness of the bearing portions 32, 34 of the insert 30 (at pre-established gauge points) will range from approximately 0.430 inches to approximately 0.247 inches. In this embodiment, the overall height of the insert (including the stabilizer 36) is approximately 1.174 inches. The support 50 used in the exemplary embodiment has an overall height of approximately 0.748 inches. The base portion of the support is approximately 0.505 inches by 0.729 inches and the diameter of the hole in

the base portion is stepped from approximately 0.356 inches to approximately 0.258 inches. The shoulder screw 60 in this embodiment is approximately 0.635 inches long with a threaded length of approximately 0.220 inches and a shoulder diameter of approximately 0.239 inches.

There have been described and illustrated herein components of a tibial prosthesis and an assembled tibial prosthesis. While particular embodiments of the invention have been described, it is not intended that the invention be limited thereto, as it is intended that the invention be as broad in scope as the art will allow and that the specification be read likewise. Thus, while particular dimensions have been disclosed, it will be appreciated that other dimensions could be utilized. Also, while particular angles have been shown, it will be recognized that other angles could be used with similar results obtained. Moreover, while particular configurations have been disclosed in reference to the stop, it will be appreciated that other configurations could be used as well. Furthermore, while the prosthesis has been disclosed as being made from particular materials, it will be understood that different materials can achieve the same or similar function as disclosed herein. It will therefore be appreciated by those skilled in the art that yet other modifications could be made to the provided invention without deviating from its spirit and scope as so claimed.

What is claimed is:

1. A tibial prosthesis comprising:

- a) a base support member having a proximal supporting surface and a single integrally formed centrally located proximally flared protrusion which substantially bisects said supporting surface; and
- b) a bearing surface member having a pair of proximal bearing surfaces and a single distal distally tapered groove, said distally tapered groove dimensioned to slideably embrace said single integrally formed centrally located proximally flared protrusion.

2. A tibial prosthesis according to claim 1 wherein said single integrally formed centrally located proximally flared protrusion defines a pair of substantially parallel dovetail coupling edges.

3. A tibial prosthesis according to claim 1 wherein said base support member has a first screw receiving hole located in an anterior portion of said single integrally formed centrally located proximally flared protrusion, and said bearing surface member has an anterior second screw receiving hole which is aligned with said first screw receiving hole when said single distal distally tapered groove embraces said single integrally formed centrally located proximally flared protrusion.

4. A tibial prosthesis according to claim 3 further comprising:

- c) a shoulder screw dimensioned to pass through said second screw receiving hole and to engage threads in said first screw receiving hole.

5. A tibial prosthesis according to claim 4 wherein said bearing surface member has a centrally located upstanding hollow stabilizer.

6. A tibial prosthesis according to claim 5 further comprising:

- d) a substantially L-shaped support member having a base portion and an upstanding portion, said base portion including a counterbored third screw receiving hole and said upstanding portion dimensioned to fit inside said hollow stabilizer, wherein said shoulder screw is dimensioned to engage said base portion via said third screw receiving hole.

7. A tibial prosthesis according to claim 6 wherein said single integrally formed centrally located proximally flared protrusion has an upstanding posterior stop which abuts said support member when said first, second and third screw receiving holes are aligned.

8. A tibial prosthesis comprising:

- a) a base support member having a proximal supporting surface, a single integrally formed centrally located first dovetail coupling which substantially bisects said supporting surface, and an anterior first screw receiving hole having a distal threaded portion and a proximal unthreaded portion;
- b) a bearing surface member having a pair of proximal bearing surfaces, a single distal second dovetail coupling, and an anterior second screw receiving hole, said single distal second dovetail coupling being dimensioned to mate with said single integrally formed centrally located first dovetail coupling with said first and second screw receiving holes being aligned with each other; and
- c) a shoulder screw dimensioned to pass through said second screw receiving hole and engage said distal threaded portion of said first screw receiving hole.

9. A tibial prosthesis according to claim 8 wherein said bearing surface member has a centrally located upstanding hollow stabilizer.

10. A tibial prosthesis according to claim 9 further comprising:

- d) a substantially L-shaped support member having a base portion and an upstanding portion, said base portion including a counterbored third screw receiving hole and said upstanding portion dimensioned to fit inside said hollow stabilizer, wherein said shoulder screw is dimensioned to engage said base portion via said third screw receiving hole.

11. A tibial prosthesis according to claim 10 wherein said single integrally formed centrally located first dovetail coupling has an upstanding posterior stop which abuts said support member when said first, second and third screw receiving holes are aligned.

12. A tibial prosthesis comprising:

- a) a base support member having a proximal supporting surface and a centrally located first dovetail coupling with an upstanding posterior stop;
- b) a bearing surface member having a pair of proximal bearing surfaces, an upstanding hollow stabilizer, and a centrally located distal second dovetail coupling, said second dovetail coupling dimensioned to slideably embrace said first dovetail coupling; and
- c) a stabilizer support member dimensioned to fit inside said upstanding hollow stabilizer and abut said posterior stop when said second dovetail coupling slideably embraces said first dovetail coupling.

13. A tibial insert for use with a tibial baseplate having a proximal supporting surface and a single integrally formed centrally located proximally flared protrusion which substantially bisects said supporting surface, said insert comprising a bearing surface member having a pair of proximal bearing surfaces and a single distal distally tapered groove, said single distally tapered groove dimensioned to slideably embrace said single integrally formed centrally located proximally flared protrusion.

14. A tibial insert according to claim 13 wherein said bearing surface member has a centrally located upstanding hollow stabilizer and an anterior screw receiving hole.

15. A tibial base plate for use with a tibial insert having a pair of proximal bearing surfaces and a single distal

distally tapered groove, said base plate comprising a base support member having a proximal supporting surface and a single integrally formed centrally located proximally flared protrusion which substantially bisects said supporting surface and which is dimensioned to slideably embrace said distally tapered groove.

16. A tibial base plate according to claim 15 further comprising an upstanding stop located on a posterior portion of said single integrally formed centrally located proximally flared protrusion.

17. A tibial base plate according to claim 15 wherein said single integrally formed centrally located proximally flared protrusion has an anterior screw receiving hole, said hole having a distal threaded portion and a proximal unthreaded portion.

18. A tibial base plate according to claim 17 wherein said screw receiving hole is dimensioned to receive a shoulder screw.

19. A method for assembling a tibial prosthesis comprising the steps of:

- a) obtaining a base support member having a proximal supporting surface and a single integrally formed centrally located proximally flared protrusion which substantially bisects said supporting surface;
- b) obtaining a bearing surface member having a pair of proximal bearing surfaces and a single distally tapered groove; and
- c) sliding the bearing surface onto the base support member so that the single distally tapered groove embraces said single integrally formed centrally located proximally flared protrusion.

20. A method for assembling a tibial prosthesis comprising the steps of:

- a) obtaining a base support member having a proximal supporting surface, a single integrally formed centrally located first dovetail coupling which substantially bisects said supporting surface, and an anterior first screw receiving hole having a distal threaded portion and a proximal unthreaded portion;
- b) obtaining a bearing surface member having a pair of proximal bearing surfaces, a single distal second dovetail coupling, and an anterior second screw receiving hole;
- c) obtaining a shoulder screw dimensioned to pass through the second screw receiving hole and engage the distal threaded portion at the first screw receiving hole;
- d) sliding the bearing surface member onto the base support member such that said second dovetail coupling mates with said single integrally formed centrally located first dovetail coupling and the first and second screw receiving holes are aligned with each other;
- e) inserting the shoulder screw through the first and second screw receiving holes; and

f) threading the screw into the threaded portion of the first screw receiving hole.

21. A method according to claim 20 further comprising the steps of:

- g) obtaining a substantially L-shaped support member having a base portion and an upstanding portion, the base portion including a counterbored third screw receiving hole, the bearing surface member having a hollow stabilizer portion dimensioned to receive the upstanding portion; and
- h) prior to said step of sliding, inserting the upstanding portion of the support member into the stabilizer portion so that the third screw receiving hole is aligned with the second screw receiving hole.

22. A method for assembling a tibial prosthesis comprising the steps of:

- a) obtaining a base support member having a proximal supporting surface, a single integrally formed centrally located first dovetail coupling which substantially bisects said supporting surface and an upstanding posterior stop;
- b) obtaining a bearing surface member having a pair of proximal bearing surfaces, an upstanding hollow stabilizer, and a single centrally located distal second dovetail coupling;
- c) obtaining a stabilizer support member dimensioned to fit inside said upstanding hollow stabilizer;
- d) inserting said stabilizer support member into said hollow stabilizer; and
- e) sliding the bearing surface member onto said base support member so that said single centrally located second dovetail coupling embraces said single integrally formed centrally located first dovetail coupling and said stabilizer support abuts said posterior stop.

23. A method for assembling a tibial prosthesis, comprising the steps of:

- a) obtaining a base support member having a proximal supporting surface and a centrally located first dovetail coupling with an upstanding posterior stop;
- b) obtaining a bearing surface member having a pair of proximal bearing surfaces, an upstanding hollow stabilizer having a stabilizer support member inserted therein, and a centrally located distal second dovetail coupling; and
- c) sliding the bearing surface member onto the base support member so that second dovetail coupling embraces the first dovetail coupling and the stabilizer support abuts the posterior stop.

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60/3K/17 (Item 17 from file: 348) [Links](#)

EUROPEAN PATENTS

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01750381

Modular prosthetic knee implant system comprising femoral stem augment

Modulares Knieprothesensystem mit Zwischenelement für Oberschenkelschaft

Système modulaire d'implant du genou avec pièce intermédiaire pour une tige femorale

Système modulaire d'implant du genou avec pièce intermédiaire pour une tige femorale

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Specification: ...A1

The present invention relates to modular components of a prosthetic joint, and more particularly to modular components of a prosthetic knee joint.

The knee joint basically consists of the bone interface of the distal end of the femur and the proximal end of the tibia. Appearing to cover or at least partially protect this interface is the patella, which is a sesamoid bone within the tendon of the long muscle (quadriceps) on the front of the thigh. This tendon inserts into the tibial tuberosity and the posterior surface of the patella is smooth and glides over the femur.

The femur is configured with two knob like processes (the medial condyle and the lateral condyle), which... slightly cupped thereby providing a slight receptacle for receipt of the femoral condyles.

When the knee joint is injured whether as a result of an accident or illness, a prosthetic replacement of the damaged joint may be necessary to relieve pain and to restore normal use... means of a surgical procedure, which involves removal of the ends of the corresponding damaged bones and replacement of these ends with prosthetic implants. This replacement of a native joint with a prosthetic joint is referred to as a primary total-knee arthroplasty.

Prosthetic knee implants include femoral implants that are designed to be affixed to the distal end of the resected femur. A known modular femoral implant is illustrated in FIGS. 1-3. As there shown, the modular femoral implant 10 includes a femoral component 12, an elongate stem member 14, bolt 16 (shown in... portions 20, 22 with articulating surfaces 24, 26 to engage an articulating surface of a tibial implant (not shown). On the proximal side of the femoral component 12, the two condylar portions... outer surfaces.

As shown in FIG. 2, when assembled, the stem member 14 is typically angled in a medial direction. The angle is labelled in FIG. 2 as (alpha). The angle (alpha) is between the axis 40 of the stem member 14 and a line 41... ..of the seating or mounting platform 34 of the intercondylar pad or box 28. The angle (alpha) corresponds with the valgus angle when the implant assembly is implanted; the valgus angle is defined as the angle between the centre line of the femur and the vertical axis connecting the distal femur and the centre of the femoral head... ..head will correspond with the line 41.

In the illustrated prior art modular assembly, the angle (alpha) is set by the structure of the femoral stem collar 18. The femoral stem... ..a plane and an inferior side or surface 35 lying in a plane that is not parallel to the plane of the superior side or surface 33. The inferior surface of the collar is angled, defining an obtuse angle (90(degree) + (alpha)) with the axis 40 of the stem. In typical implant sets, a plurality of femoral stem collars 18 are provided, shaped so that the angle (alpha) can be set to be any one of a number of angles. In one implant set available from DePuy Orthopaedics, Inc. of Warsaw, Indiana, the femoral stem collars are shaped to define angles (alpha) of either 5(degree) or 7(degree), but angles (alpha) may be in a typical range of 5 to 9(degree).

Although not shown... ..of the bolt 16. The central bore has a central longitudinal axis defining an obtuse angle with at least one of the plane of the superior side 33 and inferior side 35 of the stem collar 18.

To ensure that the angle (alpha) remains in the illustrated orientation, the intercondylar box or pad 28 typically has a pair of anti-rotation tabs 46, 48 (see FIGS. 1 and 3) that mate with opposing flats 50, 52 on the femoral stem collars 18.

As commercially supplied, the6126693.

Although known systems versatile and economic, in some instances, it may be desirable to implant the femoral components with a neutral valgus angle.

The present invention provides an enhancement to prior art implant systems by allowing for setting the femoral stem member of a modular implant assembly at a neutral valgus angle.

In one aspect, the invention provides a modular prosthetic knee implant system comprising:

a femoral component including a pair of condylar portions and an intercondylar portion having a mounting platform;

a stem member;

aare capable of being assembled so that the stem member is in a first fixed angular relationship with the mounting platform; and

wherein the femoral component, stem member, stem collar, and... ..are capable of being assembled so that the stem member is in a second fixed angular relationship with the mounting platform.

In another aspect, the invention provides a modular prosthetic knee implant system comprising:

a femoral component having a pair of condylar portions and an intercondylar portion having a mounting platform, at least part of... ..of the superior side and at least part of the inferior side lying in separate non-parallel planes, the stem collar further having a bore extending from the superior side to the inferior side, the bore having a central

longitudinal axis defining an obtuse angle with at least one of the plane of the superior side and the plane of... part the superior side and at least part of the inferior side lying in separate non-parallel planes, the augment having a bore extending from the superior side to the inferior side, the bore having a central longitudinal axis defining an obtuse angle with at least one of the plane of the superior side and the plane of... inferior side;

the stem collar, augment and mounting platform of the femoral component further including mating anti-rotation members.

In a further aspect, the invention provides a modular augment for use with a prosthetic knee implant comprising:

a body including a superior side and an inferior side,

at least a portion... side to the inferior side;

the bore having a central longitudinal axis defining an obtuse angle with at least one of the superior plane and inferior plane.

In yet another aspect, the invention provides a prosthetic knee implant comprising:

a femoral component including a pair of condylar portions and an intercondylar portion having a mounting platform with an opening;

an ... collar to the stem member.

The invention can therefore be viewed as providing a modular prosthetic knee implant system comprising a femoral component, a stem member, a stem collar and an augment. The... are capable of being assembled so that the stem member is in a first fixed angular relationship with the mounting platform. The femoral component, stem member, stem collar, and augment are also capable of being assembled so that the stem member is in a second fixed angular relationship with the mounting platform.

The invention can also be viewed as providing a modular prosthetic knee implant system comprising a femoral component, a stem member, a stem collar, and an augment. The... of the superior side and at least part of the inferior side lie in separate non-parallel planes. The stem collar also has a bore extending from the superior side to the inferior side; the bore has a central longitudinal axis that defines an obtuse angle with at least one of the plane of the superior side and the plane of... side and at least part of the inferior side of the augment lie in separate non-parallel planes. The augment also has a bore extending from the superior side to the inferior side; the bore has a central longitudinal axis that defines an obtuse angle with at least one of the plane of the superior side and the plane of... inferior side. The stem collar, augment and mounting platform of the femoral component further include mating anti-rotation members.

The invention can also be viewed as providing a modular augment for use with a prosthetic knee implant. The modular augment has a body with a superior side and an inferior side. At... side of the augment. The bore has a central longitudinal axis that defines an obtuse angle with at least one of the superior plane and inferior plane.

The invention can also be viewed as providing a prosthetic knee implant comprising a femoral component, an augment, a stem collar, a stem and a bolt. The... the posterior side;

FIG. 3 is an exploded view of the prior art modular femoral implant of FIGS. 1-2;

FIG. 4 is a perspective view of a femoral stem augment incorporating the principles of... The femoral stem augment 60 of the present invention may be used with commercially available prosthetic knee components, as shown in FIGS. 8-12, where the same reference numbers for prior art... augment 60 lies in a superior plane and the inferior side 64 lies in a non-parallel inferior plane. The femoral stem augment has a central opening 66 in the superior side... 6-7. As there shown, the superior surface 62 of the augment 60 defines an angle (theta) with the inferior surface 64. The angle (theta) corresponds with one of the valgus angles provided by the femoral stem collars 18. For example, if an implant kit includes femoral stems and collars 18 defining angles of 5(degree) and 7(degree), then the stem augment 60 should be provided to define a counter angle of either 5(degree) and 7(degree). Although a kit could include stem augments 60 of both angles, only one set of augments with one angle should be necessary since the kit would generally include a complete set of stem members... the bore or channel 72 has a central longitudinal axis 90 that defines an obtuse angle with at least one of the superior plane 92 and inferior plane 94 of the... components share a single co-linear central longitudinal axis 90 that also defines an obtuse angle with respect to the plane of the inferior surface 33 of the stem collar 18... anti-rotation flats 68, 69 of the illustrated femoral stem augment 60 are defined by

undercuts 80, 82 in the femoral stem augment 60 beneath the tabs 70, 71. The inferior... to each other, and are positioned opposite to one another in the illustrated embodiment. The undercuts 80, 82 are aligned with the tabs 70, 71, each undercut lying between one tab and the inferior plane 94 of the body 61 of the... femoral stem members 14, femoral collars 18 and femoral components 12, as well as the tibial and patellar implants, can be those commercially available from DePuy Orthopaedics, Inc. of Warsaw, Indiana, sold under the trade marks PFC SIGMA and PFC SIGMA RP ... finishes. The modified system would also include one or more stem augments 60 defining an angle (theta) of corresponding with one of the angles (alpha). However, it should be understood that the present invention is not limited to any... the surgeon can prepare the proximal end of the tibia and distal end of the femur in the standard manner, and resect these bones in the standard manner to receive the prosthetic components. As part of this process, the surgeon can ream the femoral intramedullary canal to... can assemble the prior art components as shown in FIGS. 1-3, with the femoral implant defining a valgus angle of 5(degree)-9(degree). If the patient's anatomy makes such a standard implant... assembly can be used whether the implant system will be used to define a valgus angle or whether a neutral axis is desired.

If a neutral axis is desired and the stem augment 60 of the system has an angle (theta) of 5(degree), then a stem/collar sub-assembly with an angle (alpha) of 5(degree) is selected. The length and other characteristics of the stem member... stem augment 60 is aligned so that the anti-rotation surfaces 68, 69 of its undercuts 80, 82 are received against the tabs 46, 48 of the intercondylar box 28 to... the use of flats and tabs, other arrangements can be used, such as pegs and mating holes.

It should be understood that the same system could be used for patient's requiring a standard valgus angle. The surgeon can decide intraoperatively to assemble the femoral component with a stem/collar sub... The augment 60 of the present invention can be made of any conventional material for orthopaedic implants, such as cobalt-chrome steel or titanium, or any other material that is in current orthopaedic use or becomes used in orthopaedic applications. The augment 60 can be made using standard...

Specification: ...inferior side; the stem collar, augment and mounting platform of the femoral component further including mating anti-rotation members.

The invention can therefore be viewed as providing a modular prosthetic knee implant system comprising a femoral component, a stem member, a stem collar and an augment. The ... are capable of being assembled so that the stem member is in a first fixed angular relationship with the mounting platform. The femoral component, stem

member, stem collar, and augment are also capable of being assembled so that the stem member is in a second fixed angular relationship with the mounting platform.

The invention can also be viewed as providing a modular prosthetic knee implant system comprising a femoral component, a stem member, a stem collar, and an augment. The... ..of the superior side and at least part of the inferior side lie in separate non-parallel planes. The stem collar also has a bore extending from the superior side to the inferior side; the bore has a central longitudinal axis that defines an obtuse angle with at least one of the plane of the superior side and the plane of... ..side and at least part of the inferior side of the augment lie in separate non-parallel planes. The augment also has a bore extending from the superior side to the inferior side; the bore has a central longitudinal axis that defines an obtuse angle with at least one of the plane of the superior side and the plane of... ..inferior side. The stem collar, augment and mounting platform of the femoral component further include mating anti-rotation members.

The invention can also be viewed as providing a modular augment for use with a prosthetic knee implant. The modular augment has a body with a superior side and an inferior side. At... ..side of the augment. The bore has a central longitudinal axis that defines an obtuse angle with at least one of the superior plane and inferior plane.

The invention can also be viewed as providing a prosthetic knee implant comprising a femoral component, an augment, a stem collar, a stem and a bolt. The... ..the posterior side;

FIG. 3 is an exploded view of the prior art modular femoral implant of FIGS. 1-2;

FIG. 4 is a perspective view of a femoral stem augment incorporating the principles of... ..The femoral stem augment 60 of the present invention may be used with commercially available prosthetic knee components, as shown in FIGS. 8-12, where the same reference numbers for prior art... ..augment 60 lies in a superior plane and the inferior side 64 lies in a non-parallel inferior plane. The femoral stem augment has a central opening 66 in the superior side... ..6-7. As there shown, the superior surface 62 of the augment 60 defines an angle theta with the inferior surface 64. The angle theta corresponds with one of the valgus angles provided by the femoral stem collars 18. For example, if an implant kit includes femoral stems and collars 18 defining angles of 5(deg) and 7(deg), then the stem augment 60 should be provided to define a counter angle of either 5(deg) and 7(deg). Although a kit could include stem augments 60 of both angles, only one set of augments with one angle should be necessary since the kit would generally include a complete set of stem members... ..the bore or channel 72 has a central longitudinal axis 90 that defines an obtuse angle with at least one of the superior plane 92 and inferior plane 94 of the... ..components share a single co-linear central longitudinal axis 90 that also defines an obtuse angle with respect to the plane of the inferior surface 33 of the stem collar 18... ..anti-rotation flats 68, 69 of the illustrated femoral stem augment 60 are defined by undercuts 80, 82 in the femoral stem augment 60 beneath the tabs 70, 71. The inferior... ..to each other, and are positioned opposite to one another in the illustrated embodiment. The undercuts 80, 82 are aligned with the tabs 70, 71, each undercut lying between one tab and the inferior plane 94 of the body 61 of the... ..femoral stem members 14, femoral collars 18 and femoral components 12, as well as the tibial and patellar implants, can be those commercially available from DePuy Orthopaedics, Inc. of Warsaw, Indiana, sold under the trade marks PFC SIGMA and PFC SIGMA RPfinishes. The modified system would also include one or more stem augments 60 defining an angle theta of corresponding with one of the angles alpha. However, it should be understood that the present invention is not limited to any... ..the surgeon can prepare the proximal end of the tibia and distal end of the femur in the standard manner, and resect these bones in the standard manner to receive the prosthetic components. As part of this process, the surgeon can ream the femoral intramedullary canal to... ..can assemble the prior art components as shown in FIGS. 1-3, with the femoral implant defining a valgus angle of 5(deg)-9(deg). If the patient's anatomy makes such a standard implant... ..assembly can

be used whether the implant system will be used to define a valgus angle or whether a neutral axis is desired.

If a neutral axis is desired and the stem augment 60 of the system has an angle theta of 5(deg), then a stem/collar sub-assembly with an angle alpha of 5(deg) is selected. The length and other characteristics of the stem member... stem augment 60 is aligned so that the anti-rotation surfaces 68, 69 of its undercuts 80, 82 are received against the tabs 46, 48 of the intercondylar box 28 to... the use of flats and tabs, other arrangements can be used, such as pegs and mating holes.

It should be understood that the same system could be used for patient's requiring a standard valgus angle. The surgeon can decide intraoperatively to assemble the femoral component with a stem/collar sub... The augment 60 of the present invention can be made of any conventional material for orthopaedic implants, such as cobalt-chrome steel or titanium, or any other material that is in current orthopaedic use or becomes used in orthopaedic applications. The augment 60 can be made using standard...

Claims: ...A1

1. A prosthetic knee implant including a modular augment comprising:

a body including a superior side and an inferior side... the inferior side, in which the bore has a central longitudinal axis defining an obtuse angle with at least one of the superior plane and inferior plane.

2. The prosthetic knee implant of claim 1 further comprising:

a femoral component including a pair of condylar portions and... member; and

a stem collar having a superior side and an inferior side.

3. The prosthetic knee implant of claim 2 wherein:

the femoral component, stem member and stem collar are capable of being assembled so that the stem member is in a first fixed angular relationship with the mounting platform; and

wherein the femoral component, stem member, stem collar, and... are capable of being assembled so that the stem member is in a second fixed angular relationship with the mounting platform.

4. The prosthetic knee implant system of claim 2 or claim 3 wherein:

the mounting platform of the femoral component lies in a plane... of the superior side and at least part of the inferior side lying in separate non-parallel planes, the stem collar further having a bore extending from the superior side to the inferior side, the bore having a central longitudinal axis defining an obtuse angle with at least one of the plane of the superior side and the plane of the inferior side.

5. The prosthetic knee implant system of claim 4 wherein:

the stem collar and femoral augment are capable of being... femoral component with the inferior side of the augment against the mounting platform.

6. The prosthetic knee implant system of any of claims 2-5 wherein the stem collar, augment and mounting

platform include mating anti-rotation members.

7. The prosthetic knee implant system of claim 6 wherein the anti-rotation members comprise:

opposing tabs on the mounting... stem collar; and

opposing anti-rotation surfaces and upstanding tabs on the augment.

8. The prosthetic knee implant system of claim 7 wherein the distance between the opposing anti-rotation surfaces on the... same as the distance between the opposing anti-rotation surfaces on the augment.

9. The prosthetic knee implant system of claim 7 or claim 8 wherein the distance between the opposing tabs on...



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Lee et al.

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(54) **PROSTHETIC KNEE IMPLANT WITH
MODULAR AUGMENT**

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(56) **References Cited**

U.S. PATENT DOCUMENTS

4,936,847 A * 6/1990 Manginelli 623/20.16
5,152,796 A * 10/1992 Slamin 623/20.15
5,531,793 A * 7/1996 Kelman et al.
5,556,433 A * 9/1996 Gabriel et al. 623/20.36
5,683,472 A * 11/1997 O'Neil et al. 623/20.31

5,944,756 A * 8/1999 Fischetti et al. 623/23.15
6,126,693 A * 10/2000 O'Neil et al. 623/20.32
6,171,342 B1 1/2001 O'Neil et al.
6,423,096 B1 * 7/2002 Musset et al. 623/20.15
6,527,807 B1 * 3/2003 O'Neil et al. 623/20.15
6,613,092 B1 * 9/2003 Kana et al. 623/20.15
6,629,978 B2 * 10/2003 Schulzki et al. 606/86

FOREIGN PATENT DOCUMENTS

EP 0985386 A 3/2000

OTHER PUBLICATIONS

P.F.C. Sigma Knee System — Revision Surgical Technique
Specialist 2 Instruments Brochure.
European Search Report.

* cited by examiner

Primary Examiner—Corrine McDermott
Assistant Examiner—Suzette J. Jackson

(57) **ABSTRACT**

A modular prosthetic knee implant system includes a femoral component, a femoral stem, a femoral stem collar, an augment and a bolt. The modular prosthetic knee system can be assembled in different ways. If assembled without the augment, the stem is at a valgus angle. If assembled with the augment, the stem is at a neutral angle. The stem collar has an inferior surface that is angled with respect to its superior surface, and the augment has a superior surface that is angled with respect to its inferior surface. The components also include mating anti-rotation members to fix the relative positions of the members.

18 Claims, 8 Drawing Sheets

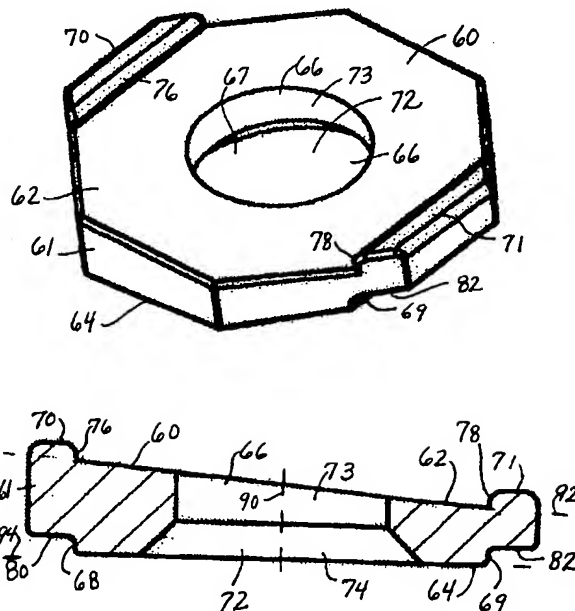


FIG 4

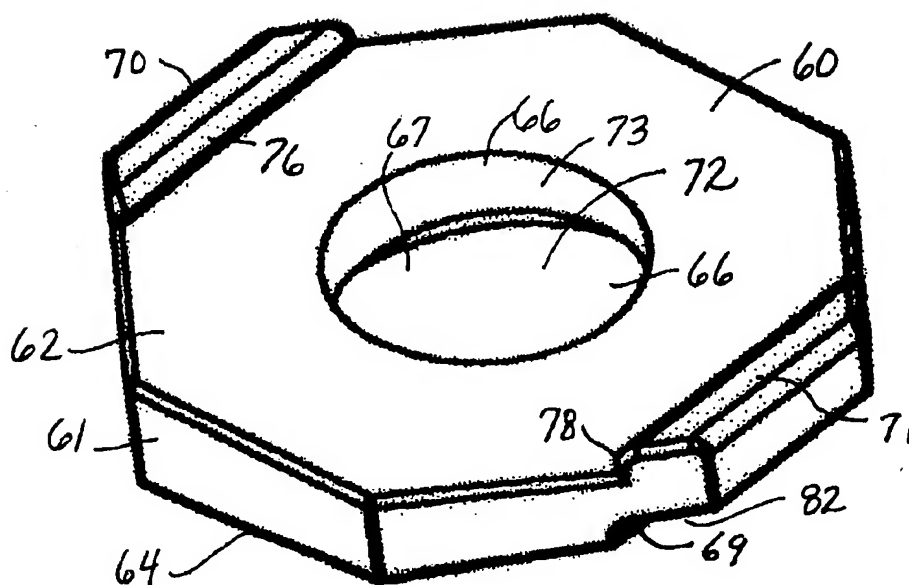
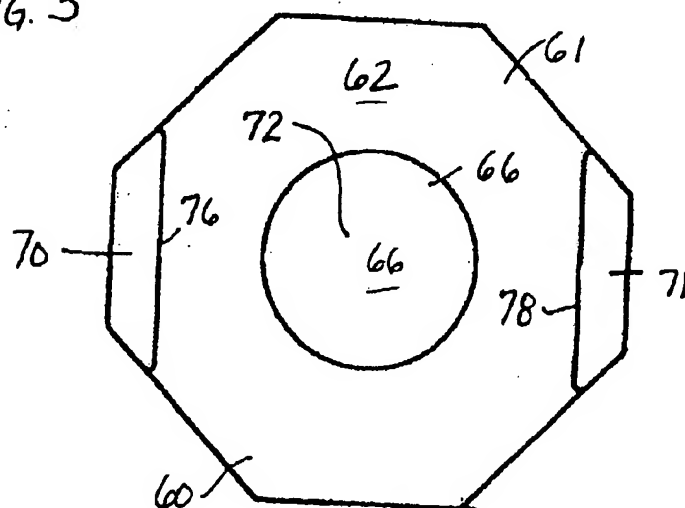
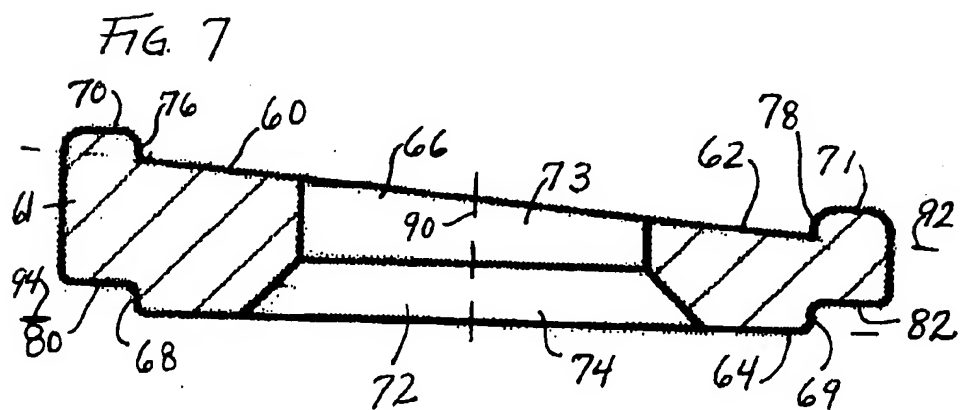
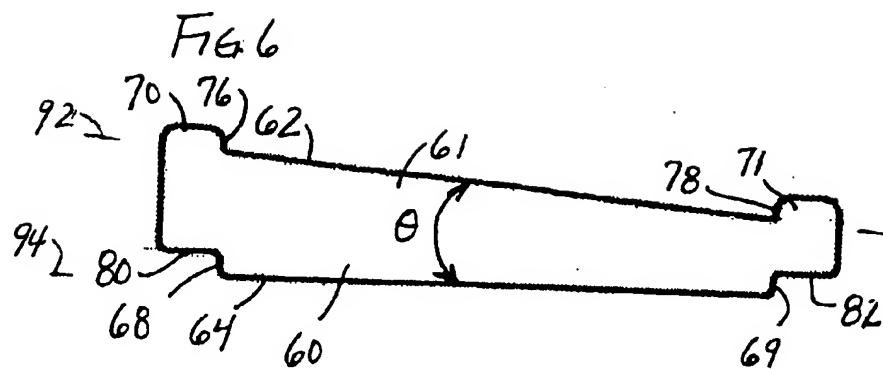


FIG. 5





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The femoral component has a pair of condylar portions and an intercondylar portion. The intercondylar portion has a mounting platform; at least part of the mounting platform lies in a plane. The stem collar has a superior side and an inferior side; at least part of the superior side and at least part of the inferior side lie in separate non-parallel planes. The stem collar also has a bore extending from the superior side to the inferior side; the bore has a central longitudinal axis that defines an obtuse angle with at least one of the plane of the superior side and the plane of the inferior side of the stem collar. The augment has a superior side and an inferior side; at least part of the superior side and at least part of the inferior side of the augment lie in separate non-parallel planes. The augment also has a bore extending from the superior side to the inferior side; the bore has a central longitudinal axis that defines an obtuse angle with at least one of the plane of the superior side and the plane of the inferior side. The stem collar, augment and mounting platform of the femoral component further include mating anti-rotation members.

In another aspect, the present invention provides a modular augment for use with a prosthetic knee implant. The modular augment has a body with a superior side and an inferior side. At least a portion of the superior side of the augment lies in a superior plane. At least a portion of the inferior side of the augment lies in an inferior plane. A bore extends from the superior side to the inferior side of the augment. The bore has a central longitudinal axis that defines an obtuse angle with at least one of the superior plane and inferior plane.

In another aspect, the present invention provides a prosthetic knee implant comprising a femoral component, an augment, a stem collar, a stem and a bolt. The femoral component includes a pair of condylar portions and an intercondylar portion having a mounting platform with an opening. The augment has an inferior side on the mounting platform of the femoral component and a superior side; the augment also has a bore extending from the superior side to the inferior side. The stem collar has an inferior side on the superior side of the augment and a superior side; the stem collar also has a bore extending from the superior side to the inferior side and aligned with the bore of the augment. The stem member extends outward from the superior side of the stem collar. The bolt extends through the opening in the mounting platform of the intercondylar portion of the femoral component, through the bore of the augment and the bore of the stem collar to the stem member.

BRIEF DESCRIPTION OF THE DRAWINGS

A prior art modular femoral implant and a modular femoral implant incorporating the principles of the present invention are illustrated in the accompanying drawings, where like reference numbers are used for like parts and wherein:

FIG. 1 is an elevation of a prior art modular femoral implant, shown assembled and from the lateral side;

FIG. 2 is an elevation of the prior art modular femoral implant of FIG. 1, shown assembled and from the posterior side;

FIG. 3 is an exploded view of the prior art modular femoral implant of FIGS. 1-2;

FIG. 4 is a perspective view of a femoral stem augment incorporating the principles of the present invention;

FIG. 5 is a top plan view of the femoral stem augment of FIG. 4;

FIG. 6 is a side elevation of the femoral stem augment of FIGS. 4-5;

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FIG. 7 is a cross-section of the femoral stem augment of FIGS. 4-6, taken along line 7-7 of FIG. 5;

FIG. 8 is an exploded view of a femoral implant assembly combining the femoral stem augment of FIGS. 4-7 with the prior art femoral implant components of FIGS. 1-3;

FIG. 9 is an elevation of the femoral implant assembly combining the femoral stem augment of FIGS. 4-7 with the prior art femoral implant components of FIGS. 1-3, shown from the posterior side;

FIG. 10 shows the femoral implant assembly of FIG. 9 from the lateral side;

FIG. 11 is a perspective view of the femoral implant assembly of FIGS. 8-10;

FIG. 12 is an enlarged perspective view of the femoral implant assembly of FIG. 11, showing the connection of the components;

FIG. 13 is an enlarged side elevation of a portion of an assembly of a femoral component, femoral stem, femoral stem collar and augment; and

FIG. 14 is a cross-section of the assembly of FIG. 13.

DETAILED DESCRIPTION OF THE INVENTION

A femoral stem augment incorporating the principles of the present invention is illustrated in FIGS. 4-12 at 60. The femoral stem augment 60 of the present invention may be used with commercially available prosthetic knee components, as shown in FIGS. 8-12, where the same reference numbers for prior art components and features of components are used as were used above in describing the prior art illustrated in FIGS. 1-3.

As shown in FIGS. 4-7, the femoral stem augment 60 comprises a body 61 having a superior side 62 and an inferior side 64. As shown in FIGS. 6-7, the superior side 62 of the augment 60 lies in a superior plane and the inferior side 64 lies in a non-parallel inferior plane. The femoral stem augment has a central opening 66 in the superior side 62, an enlarged-diameter opening 67 in the inferior side 64, a pair of inferior anti-rotation flats 68, 69 and a pair of superior anti-rotation tabs 70, 71.

As shown in FIGS. 4-5, the illustrated femoral stem augment 60 has an overall octagonal shape, in plan view, as illustrated in FIGS. 4-5. However, it should be understood that this shape is provided for purposes of illustration only. The present invention is not limited to any particular shape of femoral stem augment 60 unless expressly called for in the claims.

In elevation, the illustrated femoral stem augment 60 has a wedge shape, as shown in FIGS. 6-7. As there shown, the superior surface 62 of the augment 60 defines an angle θ with the inferior surface 64. The angle θ corresponds with one of the valgus angles provided by the femoral stem collars 18. For example, if an implant kit includes femoral stems and collars 18 defining angles of 5° and 7°, then the stem augment 60 should be provided to define a counter angle of either 5° and 7°. Although a kit could include stem augments 60 of both angles, only one set of augments with one angle should be necessary since the kit would generally include a complete set of stem members in both the 5° and 7° sizes.

In the illustrated embodiment, a bore or channel 72 extends between the apertures or openings 66, 67 of the femoral stem augment. The bore or channel 72 has a superior cylindrical portion 73 and an inferior frusto-conical portion 74. The illustrated frusto-conical portion 74 defines a coun-

60/3K/52 (Item 52 from file: 348) [Links](#)

EUROPEAN PATENTS

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APPARATUS FOR SPINAL FUSION USING IMPLANTED DEVICES

VORRICHTUNG ZUR SPONDYLODESE MIT IMPLANTIERTEN TEILEN

APPAREIL D'ARTHRODESE DU RACHIS UTILISANT DES DISPOSITIFS IMPLANTES

VORRICHTUNG ZUR SPONDYLODESE MIT IMPLANTIERTEN TEILEN

APPAREIL D'ARTHRODESE DU RACHIS UTILISANT DES DISPOSITIFS IMPLANTES

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	Country	Number	Kind	Date	
Patent	EP	1076536	A1	20010221	(Basic)
	EP	1076536	B1	20051109	
	WO	1999056676		19991111	
Application	EP	99920362		19990506	
	WO	99US9841		19990506	
Priorities	US	72777		19980506	
	US	248151		19990210	

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AT; BE; CH; CY; DE; DK; ES; FI; FR; GB;
GR; IE; IT; LI; LU; MC; NL; PT; SE;

International Patent Class (V7): A61F-002/44; A61F-002/46; A61B-017/16; A61B-017/17;
A61F-002/44... ..A61F-002/46

NOTE: No A-document published by EPO

Type	Pub. Date	Kind	Text
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Publication: English

Procedural: English

Application: English

Available Text	Language	Update	Word Count
CLAIMS B	(English)	200545	1319
CLAIMS B	(German)	200545	1340
CLAIMS B	(French)	200545	1420
SPEC B	(English)	200545	7871
Total Word Count (Document A) 0			
Total Word Count (Document B) 11950			
Total Word Count (All Documents) 11950			

Specification: ...loads. The device further comprises one or more holes through and/or cavities inside the implant such that the spaces created can be filled with bone graft material which will grow into and attach to the healthy vertebral bone. Optionally in all embodiments tapers to accommodate natural lumbar lordosis can be incorporated as necessary.

In this discussion, we use... ..material and new bony growth. As discussed at greater length below, in one embodiment, human bone allograft material is used to fabricate the implant. The new fusion bone will gradually share an increasing portion of the compressive loads experienced by the spine because the implant is made of a material, such as a polymer, which has a compressive modulus which works in conjunction with the implant design to closely match the modulus of elasticity of bone during deformation under load. The polymer, or in one embodiment human bone allograft material, has... ..being transparent in x-ray imaging permitting easy visualization of the fusion process at the vertebral interface. In a variant of one embodiment, metal retaining clips may be located in the implant surface, both above and below the dovetails, to engage the cortical bone and prevent the implant from migrating out of the intervertebral space. The retainers will generally be metal in order to benchmark x-ray imaging for... ..to assist in securing the implant to adjacent bony surfaces to minimize pullout.

In a second embodiment of the implant, a plurality of dovetail protrusions, or a compound dovetail protrusion in the approximate layout of a horseshoe may be located on the outboard portions of the implant, thereby utilizing the strength and rigidity of the vertebrae to support the spinal column load. In this case the device would contain a hollow central core which would... ..space.

In the first preferred embodiment, as shown in Figs. 1A and 1B (elevation views), vertebrae L4 and L5 (or vertebrae L5 and S1) are mechanically attached by the implant of this invention 3. The device 3 is held mechanically to the adjacent vertebrae 1 and 2 by tongue and groove, or dovetail, arrangements 4. As shown in Fig. 2 (plan view), the implant 3 is sited so as to provide mechanical support to the spine both in compression and in tension, but not so as to intrude into the space 6 occupied by the spinal nerve bundle. In this preferred embodiment, as shown in Fig.2, the implant 3 will include penetrations or holes 7 the purpose of which is to contain bone growth material to facilitate bony fusion of the adjacent vertebrae. The implant itself may comprise a variety of presently acceptable biocompatible materials such as Polyphenolsulfone, Polyaryletherketone (PEEK... ..REM glass filaments to add tensile and shear strength. As discussed more extensively below, the implant may also be fabricated from human bone allograft material, autograft material, or bone substitute material, such as

coral or calcium phosphate. The body of the implant may optionally have a modest taper to accommodate the natural lordosis of the lumbar spine.

One possible problem with an implant with dovetail fasteners fabricated from a material such as polysulfone is that torque on one adjacent vertebra relative to the other may place large tension stresses on the angular portions of the dovetail, thereby causing breaking and crazing of the polysulfone. Thus a variation on this embodiment comprises... from plastic material such as polysulfone for the body and titanium for endplates bearing the dovetail protrusions.

Figures 3A, 3B, and 3C show one possible arrangement of such a composite structure... this arrangement with the endplate extending to the shoulders of the plastic body of the implant 11. Both Figs. 3 and 4 show a variation of this structure, with the titanium endplate 12 set into the plastic body of the implant 9 and 11 in a configuration designed to provide through spaces or cavities 14 in which to place bone growth material. In these latter configurations, the polysulfone body is insert molded into the titanium endplates. The titanium dovetail fasteners possess the tensile strength necessary to avoid fracture or crazing, but the body is... two vertebrae, e.g., L4 and L5 or L5 and S1 and mechanically attached by two or more dovetail joints, or by a compound horseshoe shaped dovetail, located on each of the top and bottom surfaces of the implant to the adjacent remaining vertebrae by a composite tongue and groove mechanism similar to but larger than that used to secure the implant of the previous embodiment. In this configuration, the implant comprises either a horseshoe shaped dovetail tongue 33 which in effect creates two dovetail joints per surface toward the outboard ends of the implant top and bottom surfaces or simply two outboard dovetail tongues without the horseshoe top closure. The horseshoe top closure may be substantially curved or it may be substantially straight, with relatively square corners where the dovetail tongue angles back into the body of the vertebra. In a variation on this embodiment, inside the horseshoe shaped dovetail tongue protrusion 33 the body of the implant is hollow, that is, it contains an opening or cavity 34 communicating with both the top surface and the bottom surface into which bone growth material is placed.

In this preferred embodiment, as further shown in the isometric view of Fig. 6, the implant 35 with a relatively squared off horseshoe top closure will have a surface approximately flush with the exterior surface of the adjacent vertebrae and will appear to create one very wide dovetail 37. This embodiment of the implant will also include penetrations or holes in addition to or as an alternative to that shown in Fig. 5, 34, the purpose of which is also to contain bone growth material to facilitate bony fusion of the adjacent vertebrae. As in the prior configuration, the implant 35 is sited so as to provide mechanical support both in compression and in tension to the spinal column, but not so as to intrude into the space 6 occupied by the spinal nerve bundle. The implant in some cases is further inserted inside remaining segments of intervertebral disc tissue 38. As shown in both Figs. 5 and 6, an optional feature of these embodiments is for the faces of the implant to have locking barbs 36 to retain the implant in place between the remaining vertebrae once it is inserted.

This implant, as in the prior embodiment, may itself comprise a variety of presently acceptable implant materials such as PEEK (Polyether Ester Ketone), Acetyl (delrin), polysulfone, Ultra High Molecular Weight Polyethylene... be used to fabricate this device. This embodiment may also be fabricated with a modest taper to accommodate natural lordosis.

A third preferred embodiment of the lumbar implant, shown in isometric view in Figure 7, comprises three elements, two modular dovetail halves, 41 and 42, which are inserted between vertebrae L4 and L5 or L5 and S1 and mechanically attached by two dovetail protrusions (similar to those fabricated for the second embodiment) located on the top and bottom of the implant to the adjacent vertebrae by a tongue and groove mechanism similar to but larger than that used to secure previous embodiments of the implant. The two modular dovetail

halves are held together by a retainer 43. As in the prior configuration, as shown in the isometric view of Fig.8, the implant 35 is sited so as to provide mechanical support both in compression and in tension to the spinal column, but not so as to intrude into the space 8 occupied by the spinal nerve bundle.

In this preferred embodiment, as shown in Fig.8, the implant 35 will include a cavity 39 the purpose of which is to contain bone growth material to facilitate bony fusion of the adjacent vertebrae. The open space 39 is packed with bone growth material and then capped with a retainer, 43, designed to snap in place to add stability to the implant and to retain the bone growth factor to prevent it from migrating. This implant, as in the prior embodiment, may itself comprise a variety of presently acceptable implant materials... strength carbon fibers or glass filaments to add tensile and shear strength. Again the modular dovetail halves may be tapered to accommodate lordosis.

Any of the foregoing embodiments can additionally have a feature shown in... retractable barb 36. This barb comprises a spring wire which when deployed engages the adjacent vertebrae to prevent the implant from dislodging. A retraction tool may be inserted into the hole 39 to cause the sigma-shaped barb to retract its probe-like end so that the implant disengages from the adjacent vertebra.

As previously noted, any of the foregoing embodiments of the Cor-Lok(TM) interlocking implant can be fabricated from cadaver bone which is processed to form bone allograft material. Tissue grafting of living tissue from the same patient, including bone grafting, is... is the exact size and shape needed for the host site where it will be implanted, but it has proved very difficult to achieve this goal.

On the other hand, processing of bone material which does not contain living tissue is becoming more and more important. Non-living... sources of safely processed allograft material have recently become available.

In the present invention, allograft bone is reshaped into one of the Cor-Lok(TM) configurations for use as a spine implant. Various methods, including that of Bonutti, U.S. Patents Nos. 5,662,710 and 5... Gunderson, H. J. G., et al., "Biologically meaningful determinants of the in vitro strength of lumbar vertebrae," Bone 1991;12:219-24. Compressing bone

allograft material prior to implantation thus generally produces a stronger graft.

Compression also allows conversion of larger irregular shapes into... a precisely matching cut space. In particular, this method of formation facilitates the formation of dovetail tongue protrusions on the upper and lower surfaces of the implant for the formation of a tongue-and-groove mechanical joint with adjacent vertebrae.

In the current invention, a blank is cut from cancellous or trabecular allograft bone and... forming apparatus compresses the sample into the desired shape. In particular, this process forms the dovetail tongue protrusions on the implant upper and lower surfaces for the tongue -and-groove joint. The cancellous or trabecular material yields at the external surface under the pressure to... the allograft material to perform the same function in resisting torsion and extension of the spine as does the synthetic materials previously discussed. Such processes in general are able to maintain the homologous property of... to provide needed additional structural properties, such as tensile strength to a composite shape. Cortical bone can also be provided in a shell, much like the known femoral ring implants, to provide the needed structural properties. Moreover, a shell is not the only structural element... can be included in the same way. Using such materials, the homologous property of the bone allograft material may be maintained.

In another sub-embodiment, a relatively thin external shell of a synthetic material can be provided for enclosing compressed allograft material and providing any needed additional structural... of a material which expands after it

is placed in the spine, thereby supplementing the interlocking properties of the Cor-Lok(TM) mechanical design by improving the fill between the allograft... or polymeric materials.

Figures 10A through 16B depict the surgical tools used to install the implant. This apparatus comprises a set of unique tools which will accurately cut a dovetail joint in bone for the purpose of inserting an implant which locks adjacent vertebrae together.

The guide 44, shown in Figs. 10A and 10B, is a tubular tool with tangs 45 extending from one end. The tangs, tapered 46 to conform to natural lordosis, are inserted between the vertebrae 47 and distract them... the guide 44 to make an end-cut 52, shown in Fig. 11B, for the dovetail. Once completely inserted to the depth stop 53, a single piece interlock 54, shown in Figs. 12A and 12B, which prevented rotation of the blade 55 during... cut tool 52 from the guide 44. As shown in Figs. 12A and 12B, the interlock 54 is held by spring 57 such that it engages the slot 58 in the... As the end cut tool 52 is inserted into the guide 44 it pushes the interlock 54, rotating it out of the slot 58 in the shaft 56 as shown in Fig. 12B. As the interlock rotates, it engages the guide 44 as shown in Fig. 12B. When the shaft 56 is rotated as shown in Fig. 12B the interlock 54 cannot return to its original position as shown in Fig. 12A, thus securing the end cut tool 52 in the guide 44. The rotation interlock protects the surgeon from the end cut blade 55 and the withdrawal interlock holds the end cut tool 52 in the guide 44 while the blade 55 is... at which the end cut tool 52 can be removed from the guide 44.

The dovetail tome 60, shown in Fig. 13A, is inserted into the guide 44 to the point where the blade 61 rests against the vertebrae 47. As shown in Fig. 15, the driver 68 is placed on the dovetail tome rod extension 62 and drives the dovetail tome 60, cutting the vertebrae 47, until the depth stop 63 of the dovetail tome contacts the stop 51 on the guide 44, stopping the blade 61 at the end-cut 52, as shown in Fig. 13C. The dovetail tome blade 61, as shown in Fig. 14A, has endplate breakers 64 which split the... 14B, preventing them from jamming in the blade and preparing them for later use. The dovetail tome 60 is removed and the bone 67 and the split vertebral end plate 66 contained in the blade 61 is harvested for later use in the implant 33.

As shown in Fig. 15, the driver 68 is a pneumatic tool like a... 68 receives the rod extension from the guide adapter 70 or the rod extension of dovetail tome 62 into a guide port 71. A piston 72, within the driver 68, repeatedly impacts the guide adapter 70 or the dovetail tome rod extension 62, driving the tool into place. The driver 68 is activated by... several thousand small impacts in place of a few massive blows from a hammer.

The implant 33 of Fig. 5 is prepared for insertion by filling the interior portion 34 with harvested bone 67 and the split end plates 66 from the dovetail tome cuts and additional bone and graft stock. The implant 33 is then slid down the guide 44 (Fig. 10) and driven into place by... contacts the depth stop 51 of the guide 44 and assures correct placement of the implant 33, locking the vertebrae 47.

The above implant devices contain attachment means which are well known in the woodworking industry, but are not used in Orthopedic Spine Surgery. However, one skilled in the art of intervertebral implants would readily be able to adapt other fastening devices known in the woodworking art to spinal implant devices. It should be readily apparent to anyone skilled in the art that there are several available means to attach bone surfaces to the adjacent implant surfaces, such as causing bone anchors to protrude from the implant surface and impinge and attach the adjacent vertebrae to the implant. Metal staple-like clips can be driven between adjacent vertebrae to attach the edges of the vertebrae. Tack and staple configurations can substitute for the dovetail tongue and groove fasteners. Bone anchors can also be used to attach natural tissue to adjacent vertebrae, creating an artificial ligament which could scar down, thus retaining an artificial implant within the disc space while

osteoid induction takes place and the vertebrae fuse.



US006096080A

United States Patent [19]

Nicholson et al.

[11] **Patent Number:** **6,096,080**[45] **Date of Patent:** **Aug. 1, 2000**[54] **APPARATUS FOR SPINAL FUSION USING IMPLANTED DEVICES**[75] Inventors: **James E. Nicholson**, Lincoln; **Scott G. Tromanhauser**, Marblehead; **Dale E. Whipple**, Taunton, all of Mass.[73] Assignee: **Cortek, Inc.**, Dedham, Mass.[21] Appl. No.: **09/248,151**[22] Filed: **Feb. 10, 1999****Related U.S. Application Data**

[63] Continuation-in-part of application No. 09/072,777, May 6, 1998.

[51] Int. Cl.⁷ **A61F 2/44**[52] U.S. Cl. **623/17; 623/16**[58] Field of Search **623/17, 16; 606/61**[56] **References Cited****U.S. PATENT DOCUMENTS**

4,759,766	7/1988	Buettner-Janz, et al. .	
4,904,261	2/1990	Dove et al. .	
4,946,378	8/1990	Hirayama et al.	623/17
4,950,296	8/1990	McIntyre	623/16
5,514,180	5/1996	Heffness et al.	623/17
5,609,635	3/1997	Michelson	623/17

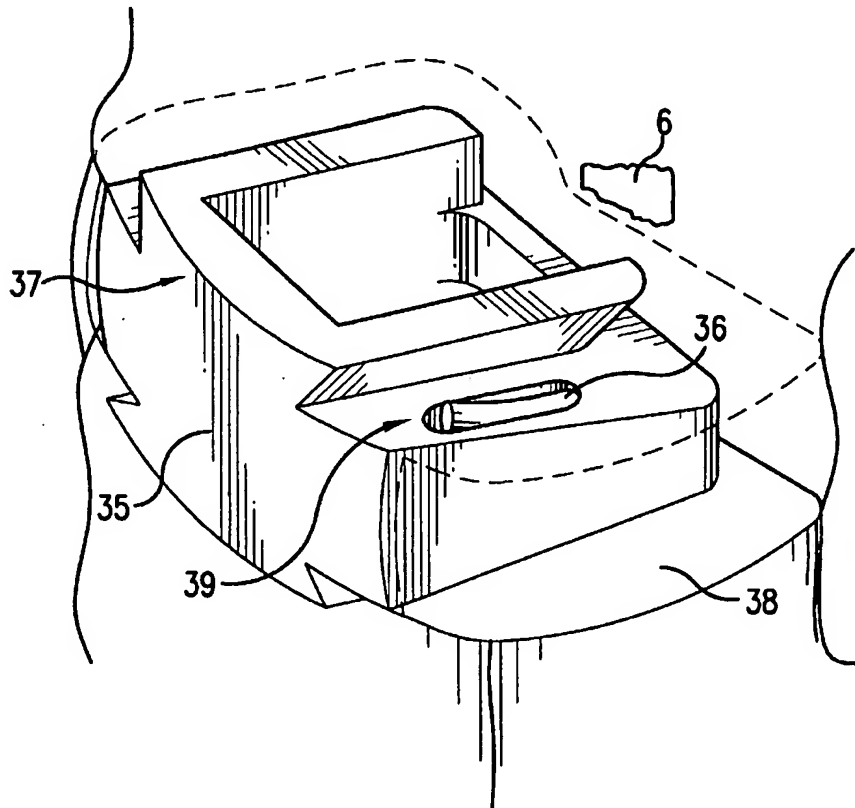
5,728,159	3/1998	Stroeve et al.	623/17 X
5,782,833	7/1998	Haider	606/61
5,814,084	9/1998	Grivas et al.	623/16
5,860,973	1/1999	Michelson	606/61
5,865,847	2/1999	Kohrs et al.	623/17
5,865,848	2/1999	Baker	623/17
5,895,426	4/1999	Scarborough et al.	623/17

FOREIGN PATENT DOCUMENTS

WO 98/17209	4/1998	WIPO	A61F 2/44
98/38918	9/1998	WIPO .	
98/42269	10/1998	WIPO .	
WO 98/55052	12/1998	WIPO	A61F 2/44
99/04733	2/1999	WIPO .	

Primary Examiner—Jeffrey A. Smith*Attorney, Agent, or Firm*—Frederick C. Williams[57] **ABSTRACT**

A spinal implant replaces excised tissue removed during spine surgery. This implant includes fasteners which firmly attach it to vertebrae adjacent to excised tissue so as to transmit tension and torsional loads to and from those vertebrae. The body of the implant has through cavities into which bone growth material is placed during surgery. The body of the implant also has a finite modulus of elasticity in compression so as to share compressive loads with emplaced bone growth material and with new bony growth facilitated by the emplaced material and the load sharing.

22 Claims, 11 Drawing Sheets

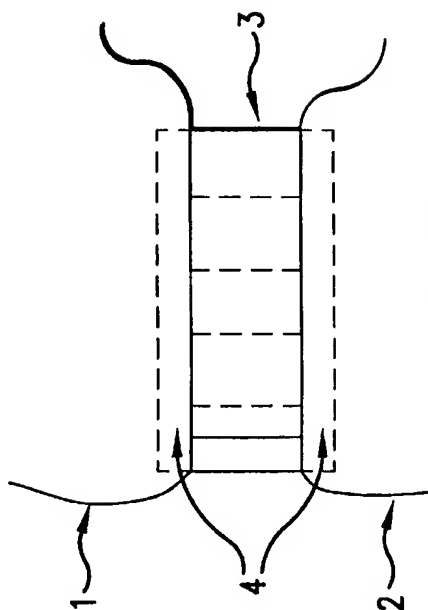


FIG. 1B

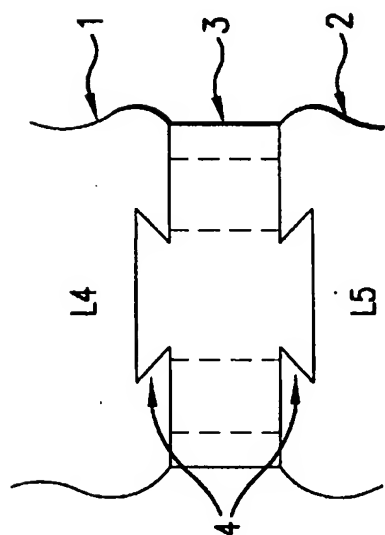


FIG. 1A

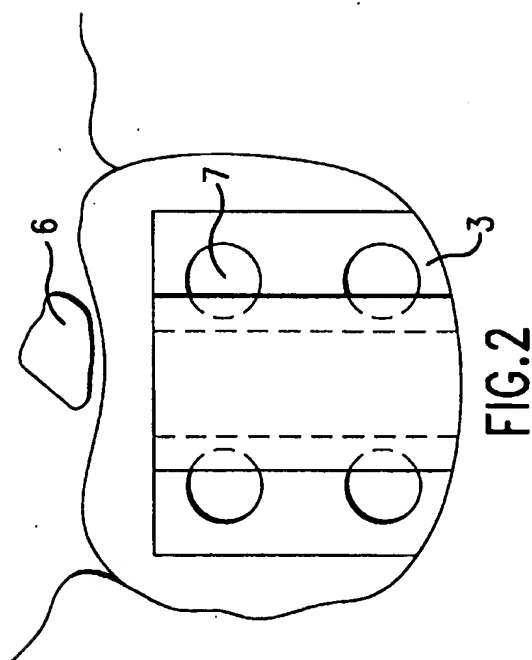


FIG. 2

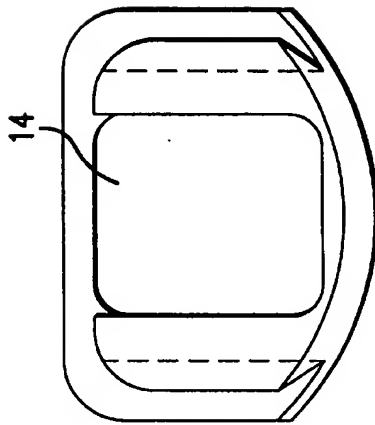


FIG. 4A

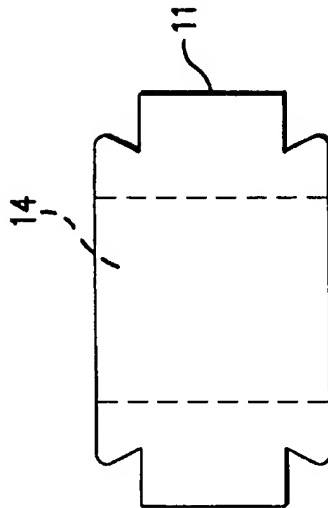


FIG. 4B

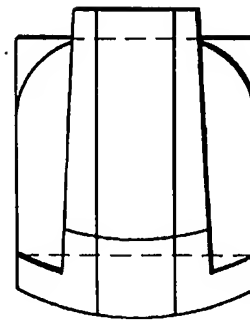


FIG. 4C

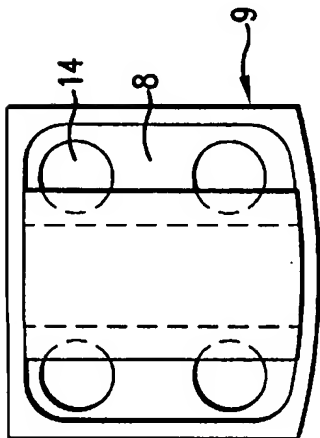


FIG. 3A

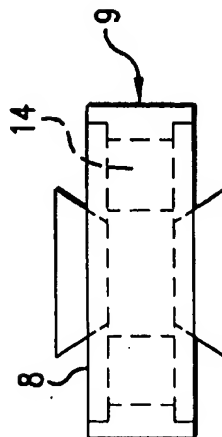


FIG. 3B

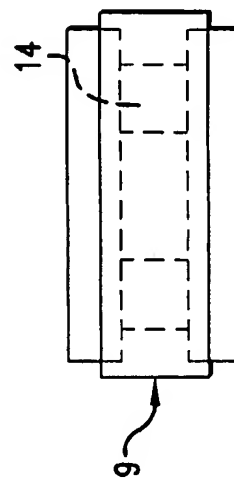


FIG. 3C

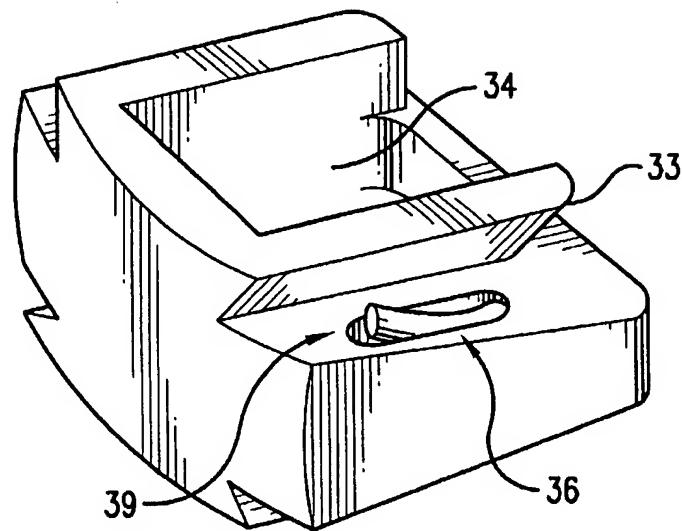


FIG. 5

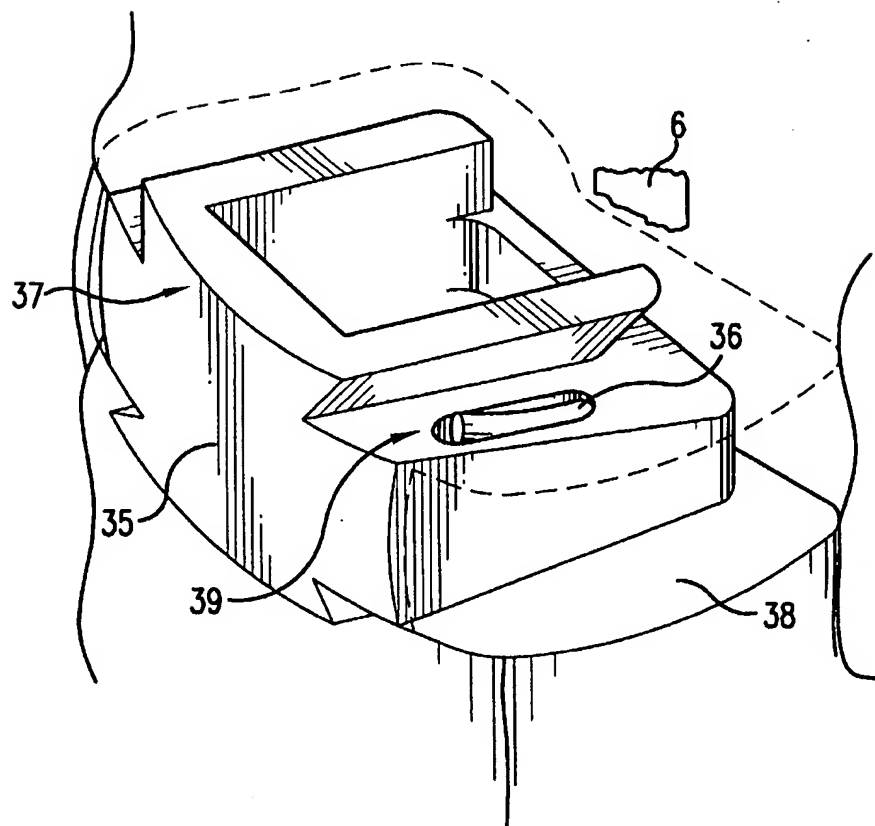


FIG. 6

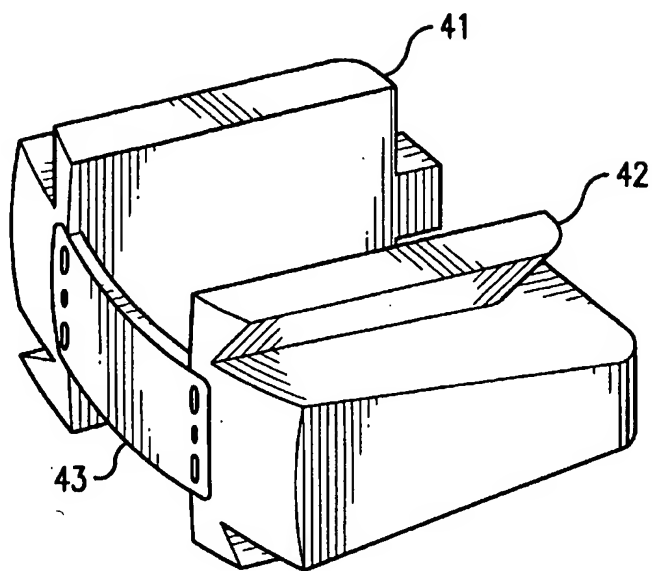


FIG. 7

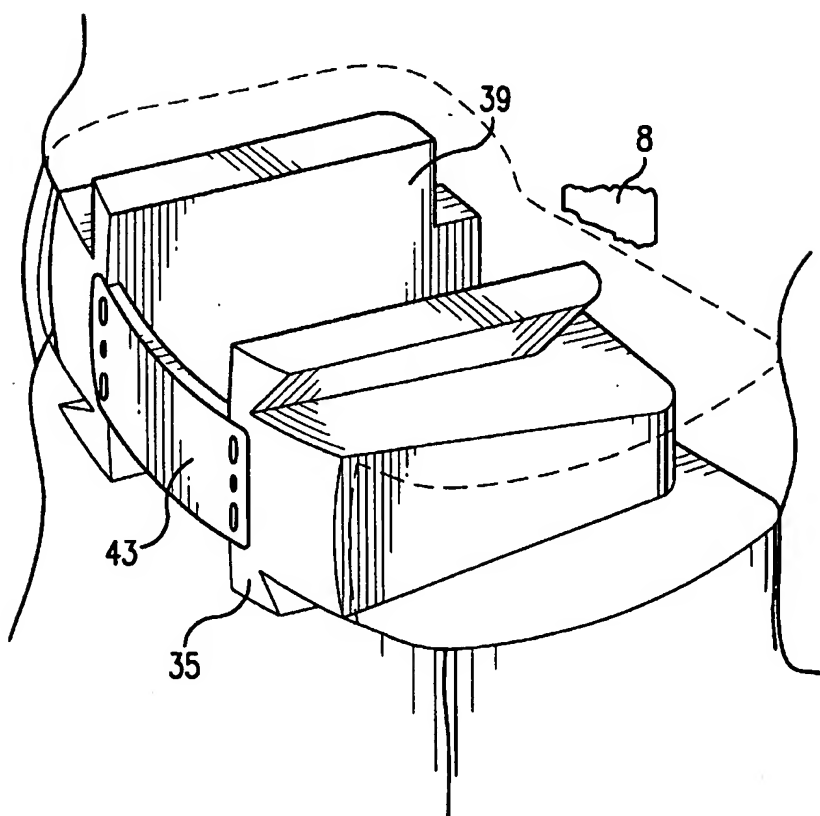


FIG. 8

34/5K/1 (Item 1 from file: 348) [Links](#)

EUROPEAN PATENTS

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02186256

Intervertebral prosthesis with self-cutting fixation protrusions

Zwischenwirbelpothese mit selbstschneidenden Fixiervorsprungen

Prothese intervertebrale avec saillies de fixation auto-penetrantes

Intervertebral prosthesis with self-cutting fixation protrusions

Patent Assignee:

- Cervitech, Inc.; (4400510)
300 Roundhill Drive; Rockaway, NJ 07866; (US)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll (100693)
Patent- und Rechtsanwälte, Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1736120	A1	20061227	(Basic)
Application	EP	2005013517		20050622	

Designated States:

AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES;
FI; FR; GB; GR; HU; IE; IS; IT; LI; LT;
LU; MC; NL; PL; PT; RO; SE; SI; SK; TR;

34/5K/2 (Item 2 from file: 348) [Links](#)

EUROPEAN PATENTS

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02082420

Cervical intervertebral prostheses

Zervikale Zwischenwirbelp Prothesen

Protheses intervertebrales cervicales

Cervical intervertebral prostheses

Patent Assignee:

- Cervitech, Inc.; (4400510)
300 Roundhill Drive; Rockaway, NJ 07866; (US)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll (100693)
Patent- und Rechtsanwälte, Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1685811	A1	20060802	(Basic)
Application	EP	2005001557		20050126	

Designated States:

AT; BE; BG; CH; CY; CZ; DE; DK; EE; ES;
FI; FR; GB; GR; HU; IE; IS; IT; LI; LT;
LU; MC; NL; PL; PT; RO; SE; SI; SK; TR;

34/5K/3 (Item 3 from file: 348) [Links](#)

EUROPEAN PATENTS

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02072161

Pair of intervertebral implants

Paar von Zwischenwirbelprothesen

Une paire de implants intervertébraux

Pair of intervertebral implants

Une paire de implants intervertébraux

Patent Assignee:

- Cervitech, Inc.; (4400510)
300 Roundhill Drive; Rockaway, NJ 07866; (US)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll (100693)
Patent- und Rechtsanwälte, Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1681039	A1	20060719	(Basic)
Application	EP	2005000841		20050117	

34/5K/4 (Item 4 from file: 348) [Links](#)

EUROPEAN PATENTS

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01761000

Hip prosthesis with a stem to be implanted into the medullary canal of the femur

Huftprouthese mit einem in den Markkanal des Oberschenkelknochens zu verankernden Schaft

Prothese de hanche avec un tige pour être implantée dans le canal médullaire du fémur

Hip prosthesis with a stem to be implanted into the medullary canal of the femur

Prothese de hanche avec un tige pour être implantée dans le canal médullaire du fémur

Patent Assignee:

- WALDEMAR LINK GmbH & Co. KG; (297143)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Proprietor designated states: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1438933	A1	20040721	(Basic)
	EP	1438933	B1	20050406	
Application	EP	2003016156		20030716	
Priorities	EP	20031040		20030117	

Designated States:

34/5K/5 (Item 5 from file: 348) [Links](#)

EUROPEAN PATENTS

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01760974

Hip prosthesis with stem for implantation into the femur

Huftprouthese mit einem in den Oberschenkelknochen einzusetzenden Schaft

Prothese de la hanche avec tige pour l'implantation dans le femur

Hip prosthesis with stem for implantation into the femur

Prothese de la hanche avec tige pour l'implantation dans le femur

Patent Assignee:

- WALDEMAR LINK GmbH & Co. KG; (297143)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1438932	A1	20040721	(Basic)
Application	EP	2003001041		20030117	

Designated States:

34/5K/6 (Item 6 from file: 348) Links

EUROPEAN PATENTS

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01687995

Knee prothesis

Knieprothese

Prothese du genou

Patent Assignee:

- WALDEMAR LINK GmbH & Co. KG; (297143)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
; ;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1384454	A1	20040128	(Basic)
Application	EP	2002016768		20020726	

Designated States:

34/5K/7 (Item 7 from file: 348) Links

EUROPEAN PATENTS

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01630067

Intervertebral prosthesis especially for the cervical spine

Zwischenwirbelpothese, insbesondere fur die Halswirbelsaule

Prothese intervertebrale en particulier pour la colonne cervicale

Intervertebral prosthesis especially for the cervical spine

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- McAfee, Paul C., M.D. Scoliosis and Spine Center
7505 Osler Drive, Suite 104; Baltimore , MD 21204; (US)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1344508	A1	20030917	(Basic)
Application	EP	2002005632		20020312	

Designated States:

34/5K/8 (Item 8 from file: 348) Links

EUROPEAN PATENTS

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01630065

Intervertebral prosthesis for the cervical spine

Zwischenwirbelpothese fur die Halswirbelsaule

Prothese intervertebrale pour la colonne cervicale

Intervertebral prosthesis for the cervical spine

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- McAfee, Paul C., M.D. c/o Scoliosis and Spine Center
7505 Osler Drive, Suite 104; Baltimore, MD 21204; (US)
- Keller, Arnold
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Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwälte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1344506	A1	20030917	(Basic)
Application	EP	2002005630		20020312	

Designated States:

AT; BE; CH; CY; DE; DK; ES; FI; FR; GB;

34/5K/9 (Item 9 from file: 348) Links

EUROPEAN PATENTS

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01519208

Coupled knee prosthesis with rotational bearing

Gekoppelte Knieprothese mit Rotationslager

Prothese du genou couple avec palier a rotation

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1269938	A1	20030102	(Basic)
Application	EP	2001115511		20010627	

34/5K/10 (Item 10 from file: 348) Links

EUROPEAN PATENTS

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01476859

Knee prosthesis with rotating bearing

Knieprothese mit Rotationslager

Prothese de genou avec palier de rotation

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Applicant designated States: all)

Inventor:

- Keller, Arnold
An der Nahefurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
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Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1252869	A1	20021030	(Basic)
Application	EP	2001110260		20010425	

Designated States:

34/5K/11 (Item 11 from file: 348) [Links](#)

EUROPEAN PATENTS

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01437958

Surgical instrument for implanting an intervertebral prosthesis

Chirurgisches Instrument zum Einsetzen einer Zwischenwirbelendoprothese

Instrument chirurgical pour implanter une prothese intervertebrale

Surgical instrument for implanting an intervertebral prosthesis

Instrument chirurgical pour implanter une prothese intervertebrale

Patent Assignee:

- Link Spine Group, Inc.; (4609371)
7 South Main Street; Branford, CT 06405; (US)
(Proprietor designated states: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
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Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwälte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1222903	A1	20020717	(Basic)
	EP	1222903	B1	20050119	
Application	EP	2001125792		20011029	
Priorities	EP	2001100754		20010112	

Designated States:

34/5K/12 (Item 12 from file: 348) Links

EUROPEAN PATENTS

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01220265

Intervertebral endoprosthesis with a toothed connection plate

Zwischenwirbel-Endoprothese mit einer gezahnten Anschlussplatte

Endoprothese intervertebrale avec une plaque de connexion dentee

Intervertebral endoprosthesis with a toothed connection plate

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Proprietor designated states: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
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Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1057462	A1	20001206	(Basic)
	EP	1057462	B1	20030402	
Application	EP	99110053		19990521	

Designated States:

34/5K/13 (Item 13 from file: 348) Links

EUROPEAN PATENTS

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01184741

Prosthetic wrist joint

Handgelenkprothese

Prothese du poignet

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Proprietor designated states: all)
- Thabe, Heiner Dr. med.; (2674470)
Wielandstrasse 26; 55543 Bad Kreuznach; (DE)
(Proprietor designated states: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Thabe, Heiner Dr. med.
Wielandstr. 26; 55543 Bad Kreuznach; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwälte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	1031332	A1	20000830	(Basic)
	EP	1031332	B1	20031001	
Application	EP	99103377		19990222	

Designated States:

34/5K/14 (Item 14 from file: 348) Links

EUROPEAN PATENTS

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00903431

Device for implanting the femoral articular element of a knee endoprosthesis

Anordnung zum Einsetzen einer femoralen Knie-Gleitflächen-Endoprothese

Dispositif pour implanter l'element articulaire femoral d'une endoprothese du genou

Device for implanting the femoral articular element of a knee endoprosthesis

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(applicant designated states: DE;ES;FR;GB;IT)

Inventor:

- Keller, Arnold
An der Baherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100698)
Patentanwalte Liebherrstrasse 20; 80538 Munchen; (DE)

	Country	Number	Kind	Date	
Patent	EP	824904	A2	19980225	(Basic)
	EP	824904	A3	19981118	
Application	EP	97112565		19970722	
Priorities	DE	29614349		19960819	

Designated States:

34/5K/15 (Item 15 from file: 348) Links

EUROPEAN PATENTS

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00883925

Saddle prosthesis

Sattelprothese

Prothese en forme de selle

Patent Assignee:

- WALDEMAR LINK GmbH & Co. KG; (297143)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Proprietor designated states: all)

Inventor:

- Nieder, Elmar Dr.
Hinterdeich 117; D-2155 Jork; (DE)
- Keller, Arnold
An der Naherfurth 5; D-23863 Kayhude; (DE)
- ...DE)
;;
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll (100697)
Patentanwalte Postfach 13 03 91; 20103 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	808617	A2	19971126	(Basic)
	EP	808617	A3	19980819	
	EP	808617	B1	20050831	
Application	EP	97108111		19970520	
Priorities	DE	19621269		19960525	

Designated States:

34/5K/16 (Item 16 from file: 348) Links

EUROPEAN PATENTS

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00791371

Endoprosthesis, in particular for the sterno-clavicular joint

Endoprothese, insbesondere für das Sternum-Clavicular-Gelenk

Endoprothese, en particulier pour l'articulation sterno-claviculaire

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Proprietor designated states: all)

Inventor:

- Keller, Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100698)
Patentanwalte Liebherrstrasse 20; 80538 Munchen; (DE)

	Country	Number	Kind	Date	
Patent	EP	737454	A1	19961016	(Basic)
	EP	737454	B1	19991124	
Application	EP	96105593		19960409	
Priorities	DE	29506419		19950413	

34/5K/17 (Item 17 from file: 348) [Links](#)

EUROPEAN PATENTS

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00753407

Device for positioning a hole in a bone

Vorrichtung zur Platzierung einer Bohrung in einem Knochen

Dispositif pour positionner un trou dans un os

Patent Assignee:

- GMT Gesellschaft für medizinische Technik mbH; (502840)
Holstenstrasse 2; 22767 Hamburg; (DE)
(Proprietor designated states: all)
- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; 22339 Hamburg; (DE)
(Proprietor designated states: all)

Inventor:

- Engelbrecht Edgar Dr.
Andreasstrasse 33; 22301 Hamburg; (DE)
- Nieder Elmar Dr.
Hinterdeich 117,; 21635 Jork; (DE)
- Keller Arnold
An der Naherfurth 5; 23863 Kayhude; (DE)
- ...DE)
;;
- Keller Arnold
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Legal Representative:

- Glawe, Delfs, Moll & Partner (100691)
Patentanwalte Rothenbaumchaussee 58; 20148 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	709072	A1	19960501	(Basic)
	EP	709072	B1	20020502	
Application	EP	95115227		19911129	
Priorities	DE	4038037		19901129	

Designated States:

34/5K/18 (Item 18 from file: 348) Links

EUROPEAN PATENTS

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00594733

Apparatus to unite bone fragments by means of a bone plate

Vorrichtung zum Verbinden von Knochenteilen mittels einer Knochenplatte

Dispositif de fixation de fragments osseux au moyen d'une plaque d'osteosynthese

Dispositif de fixation de fragments osseux au moyen d'une plaque d'osteosynthese

Patent Assignee:

- Waldemar Link GmbH & Co.; (297142)
Barkhausenweg 10; 22339 Hamburg; (DE)
(applicant designated states: AT;CH;DE;ES;FR;GB;IT;LI;SE)

Inventor:

- Eggers, Christoph, Dr.
Bertha-Uhl-Kamp 33; D-22609 Hamburg; (DE)
- Keller, Arnold
An der Naherfurth 5; D-23863 Kayhude; (DE)
- ...DE)
;;
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100698)
Patentanwälte Liebherrstrasse 20; 80538 Munchen; (DE)

	Country	Number	Kind	Date	
Patent	EP	600290	A1	19940608	(Basic)
	EP	600290	B1	19981014	
Application	EP	93118391		19931112	
Priorities	DE	9216565		19921204	

Designated States:

34/5K/19 (Item 19 from file: 348) [Links](#)

EUROPEAN PATENTS

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00591491

Knee joint endoprosthesis for replacement of the tibial articular surfaces

Kniegelenkendoprothese zum Ersatz der Schienbein-Gelenkflächen

Endoprothese de l'articulation du genou pour le remplacement des surfaces articulaires tibiales

Knee joint endoprosthesis for replacement of the tibial articular surfaces

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297141)
Barkhausenweg 10; D-22339 Hamburg; (DE)
(applicant designated states: CH;DE;ES;FR;GB;IT;LI;SE)

Inventor:

- Keller, Arnold
An der Naherfurth 5; D-23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100698)
Patentanwalte Liebherrstrasse 20; 80538 Munchen; (DE)

	Country	Number	Kind	Date	
Patent	EP	589325	A1	19940330	(Basic)
	EP	589325	B1	19970521	
Application	EP	93114701		19930913	
Priorities	DE	9212879		19920924	

Designated States:

34/5K/20 (Item 20 from file: 348) Links

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00588858

Acetabular cup for a hip joint endoprosthesis

Gelenkpfanne für eine Hüftgelenk-Endoprothese

Coque acetabulaire pour une endoprothèse de l'articulation de la hanche

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297140)
Postfach 63 05 52; D-22315 Hamburg; (DE)
(applicant designated states: CH;DE;ES;FR;GB;IT;LI;SE)

Inventor:

- Keller, Arnold
An der Naherfurth 5; D-23863 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100692)
Patentanwalte Postfach 26 01 62; 80058 München; (DE)

	Country	Number	Kind	Date	
Patent	EP	588022	A1	19940323	(Basic)
	EP	588022	B1	19960925	
Application	EP	93111704		19930721	
Priorities	DE	9212419		19920915	

Designated States:

CH; DE; ES; FR; GB; IT; LI; SE;

34/5K/21 (Item 21 from file: 348) Links

EUROPEAN PATENTS

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00563163

Intervertebral disc endoprosthesis

Bandscheibenendoprothese

Endoprothese pour disques intervertebraux

Intervertebral disc endoprosthesis

Patent Assignee:

- Waldemar Link (GmbH & Co.); (297140)
Postfach 63 05 52; D-22315 Hamburg; (DE)
(applicant designated states: AT;CH;DE;ES;FR;GB;IT;LI;SE)

Inventor:

- Buttner-Janz, Karin, Dr.
Reetzer Weg 63; O-1144 Berlin; (DE)
- Keller, Arnold
An der Naherfurth 5; W-2061 Kayhude; (DE)
- Lemaire, Jean-Philippe, Dr.
Clinique de Fontaine, 1, rue des Creots; F-21121 Fontaine les Dijon; (FR)
- ...DE)
;;
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100692)
Patentanwalte Postfach 26 01 62; 80058 Munchen; (DE)

	Country	Number	Kind	Date	
Patent	EP	560141	A1	19930915	(Basic)
	EP	560141	B1	19961030	
Application	EP	93102993		19930225	
Priorities	DE	4208116		19920313	

Designated States:

34/5K/22 (Item 22 from file: 348) [Links](#)

EUROPEAN PATENTS

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00516261

Bone plate device.

Knochenplattenanordnung.

Plaque osteosynthetique.

Plaque osteosynthetique.

Patent Assignee:

- Waldemar Link GmbH & Co; (297140)
Postfach 63 05 52; D-22315 Hamburg; (DE)
(applicant designated states: CH;DE;ES;FR;GB;IT;LI)

Inventor:

- Keller, Arnold
An der Naherfurth 5; W-2061 Kayhude; (DE)
- Keller, Arnold
;;

Legal Representative:

- Glawe, Delfs, Moll & Partner (100692)
Patentanwalte Postfach 26 01 62; D-80058 Munchen; (DE)

	Country	Number	Kind	Date	
Patent	EP	507162	A1	19921007	(Basic)
	EP	507162	B1	19940309	
Application	EP	92104908		19920320	
Priorities	DE	9104025		19910403	

Designated States:

34/5K/23 (Item 23 from file: 348) [Links](#)

EUROPEAN PATENTS

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00474399

Knee endoprosthesis

Kniegelenkendoprothese

Endoprothese de genou

Knee endoprosthesis

Patent Assignee:

- GMT Gesellschaft für medizinische Technik mbH; (502840)
Holstenstrasse 2; D-22767 Hamburg; (DE)
(applicant designated states: CH;FR;GB;LI;NL;SE)
- Waldemar Link GmbH & Co.; (297142)
Barkhausenweg 10; 22339 Hamburg; (DE)
(applicant designated states: CH;FR;GB;LI;NL;SE)

Inventor:

- Engelbrecht, Eckart
Andreasstrasse 33; W-2000 Hamburg 60; (DE)
- Nieder, Elmar
Hinterdeich 117; W-2155 Jork; (DE)
- Keller, Arnold Karl Walter
An der Naherfurth 5; 23863 Kayhude; (DE)
- ...DE)
;;
- Keller, Arnold Karl Walter...
;;

Legal Representative:

- Heldt, Gert, Dr. Dipl.-Ing. (5191)
Neuer Wall 59 III; 20354 Hamburg; (DE)

	Country	Number	Kind	Date	
Patent	EP	488378	A2	19920603	(Basic)
	EP	488378	A3	19921202	
	EP	488378	B1	19980520	
Application	EP	91120536		19911129	
Priorities	DE	4038037		19901129	

Designated States:

34/5K/24 (Item 24 from file: 348) [Links](#)

EUROPEAN PATENTS

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00427956

Elbow endoprosthesis

Ellbogengelenk-Endoprothese

Endoprothese de coude

Patent Assignee:

- GMT Gesellschaft für medizinische Technik mbH; (502840)
Holstenstrasse 2; D-22767 Hamburg; (DE)
(applicant designated states: CH;FR;GB;LI)
- Waldemar Link (GmbH & Co.); (297140)
Postfach 63 05 52; D-22315 Hamburg; (DE)
(applicant designated states: CH;FR;GB;LI)

Inventor:

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Andreasstrasse 33; W-2000 Hamburg 60; (DE)
- Keller, Arnold
An der Naherfurth 5; W-2061 Kayhude; (DE)
- ...DE)
;;
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Legal Representative:

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	Country	Number	Kind	Date	
Patent	EP	493629	A1	19920708	(Basic)
	EP	493629	B1	19960515	
Application	EP	90125819		19901231	
Priorities	EP	90125819		19901231	

Designated States:

34/5K/25 (Item 25 from file: 348) [Links](#)

EUROPEAN PATENTS

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00335591

Surgical instrument set.

Chirurgischer Instrumentensatz.

Jeu d'instruments chirurgical.

Patent Assignee:

- Waldemar Link GmbH & Co; (297140)
Barkhausenweg 10; W-2000 Hamburg 63; (DE)
(applicant designated states: DE;ES;FR;GB;IT;SE)

Inventor:

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Legal Representative:

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Postfach 162 Liebherrstrasse 20; W-8000 Munchen 26; (DE)

	Country	Number	Kind	Date	
Patent	EP	333990	A2	19890927	(Basic)
	EP	333990	A3	19900509	
	EP	333990	B1	19930721	
Application	EP	89101147		19890123	
Priorities	DE	3809793		19880323	

Designated States:

34/5K/26 (Item 26 from file: 348) Links

EUROPEAN PATENTS

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00290592

Bone plate connected to the bone by means of an inclined screw.

Mit einem Knochen mittels einer schrag verlaufenden Schraube zu verbindende Platte.

Plaque d'osteosynthese connectee a l'os par une vis inclinee.

Bone plate connected to the bone by means of an inclined screw.

Plaque d'osteosynthese connectee a l'os par une vis inclinee.

Patent Assignee:

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(applicant designated states: DE;ES;FR;GB;IT)

Inventor:

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Legal Representative:

- Glawe, Delfs, Moll & Partner Patentanwälte (100691)
Rothenbaumchaussee 58 Postfach 2570; W-2000 Hamburg 13; (DE)

	Country	Number	Kind	Date	
Patent	EP	299160	A1	19890118	(Basic)
	EP	299160	B1	19921119	
Application	EP	88107018		19880502	
Priorities	DE	8709615		19870713	

Designated States:

34/5K/27 (Item 27 from file: 348) [Links](#)

EUROPEAN PATENTS

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00287923

Saddle prosthesis.

Sattelprothese.

Prothese en forme de selle.

Patent Assignee:

- GMT Gesellschaft fur medizinische Technik mbH; (502840)
Holstenstrasse 2; D-22767 Hamburg; (DE)
(applicant designated states: AT;CH;ES;FR;GB;LI)
- Waldemar Link GmbH & Co; (297140)
Postfach 63 05 52; D-22315 Hamburg; (DE)
(applicant designated states: AT;CH;ES;FR;GB;LI)

Inventor:

- Keller, Arnold
An der Naherfurth 5; D-2061 Kaihude; (DE)
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Hinterdeich 117; D-2155 York; (DE)
- Keller, Arnold
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Legal Representative:

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	Country	Number	Kind	Date	
Patent	EP	300131	A2	19890125	(Basic)
	EP	300131	A3	19891220	
	EP	300131	B1	19931020	
Application	EP	88104296		19880318	
Priorities	DE	3710233		19870327	

Designated States:

34/5K/28 (Item 1 from file: 349) [Links](#)

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01455247

INTERVERTEBRAL PROSTHESIS COMPRISING SELF-TAPPING FIXING PROJECTIONS
PROTHESE INTERVERTEBRALE POURVUE DE STRUCTURES SAILLANTES DE FIXATION
AUTOTARAUDEUSES
ZWISCHENWIRBELPROTHESE MIT SELBSTSCHNEIDENDEN FIXIERVORSPRUNGEN
INTERVERTEBRAL PROSTHESIS COMPRISING SELF-TAPPING FIXING PROJECTIONS

Patent Applicant/Patent Assignee:

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- KELLER Arnold; An der Naherfurth 5, 23863 Kayhude
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- KELLER Arnold;
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Patent Applicant/Inventor:

- KELLER Arnold
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Legal Representative:

- GLAWE DELFS MOLL(agent)
Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	2006136373	A1	20061228
Application	WO	2006EP5910		20060620
Priorities	EP	2005135177		20050622

34/5K/29 (Item 2 from file: 349) [Links](#)

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01408895

METHOD FOR PRODUCING A MEDICAL IMPLANT MADE OF A BETA-TITANIUM MOLYBDENUM ALLOY, AND A CORRESPONDING IMPLANT

PROCEDE DE PRODUCTION D'UN IMPLANT MEDICAL EN ALLIAGE DE BETA-TITANE-MOLYBDENE ET IMPLANT CORRESPONDANT

VERFAHREN ZUM HERSTELLEN EINES MEDIZINISCHEN IMPLANTATS AUS EINER BETA-TITAN-MOLYBDAN-LEGIERUNG UND ENTSPRECHENDES IMPLANTAT

Patent Applicant/Patent Assignee:

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Patent- und Rechtsanwälte, Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200689792	A1	20060831
Application	WO	2006EP1792		20060227
Priorities	EP	200541805		20050225

34/5K/30 (Item 3 from file: 349) [Links](#)

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01398112

CERVICAL INTERVERTEBRAL PROSTHESES
PROTHESES INTERVERTEBRALES CERVICALES
ZERVIKALE ZWISCHENWIRBELPROTHESEN
CERVICAL INTERVERTEBRAL PROSTHESES

Patent Applicant/Patent Assignee:

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Patent Applicant/Inventor:

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Legal Representative:

- GLAWE DELFS MOLL(agent)
Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200679366	A1	20060803
Application	WO	2005EP10081		20050919
Priorities	EP	200515577		20050126

34/5K/31 (Item 4 from file: 349) [Links](#)

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01350796

PROSTHESIS FOR BRIDGING A VERTEBRAL BODY

PROTHESE DE PONTAGE D'UN CORPS VERTEBRAL

PROTHESE ZUR UBERBRÜCKUNG EINES WIRBELKÖRPERS

PROSTHESIS FOR BRIDGING A VERTEBRAL BODY

Patent Applicant/Patent Assignee:

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Patent Applicant/Inventor:

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Legal Representative:

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	Country	Number	Kind	Date
Patent	WO	200632311	A1	20060330
Application	WO	2005EP6317		20050613
Priorities	EP	2004226714		20040923

34/5K/32 (Item 5 from file: 349) [Links](#)

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01265174

CERVICAL PROSTHESIS AND INSTRUMENTS

PROTHESE CERVICALE ET INSTRUMENTS

ZERVIKALPROTHESE UND INSTRUMENTARIUM

Patent Applicant/Patent Assignee:

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- KELLER Arnold;
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Patent Applicant/Inventor:

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Legal Representative:

- GLAWE Delfs Moll(agent)

Patent- und Rechtsanwälte, Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200572658	A2-A3	20050811
Application	WO	2005EP458		20050118
Priorities	US	2004768713		20040202

34/5K/33 (Item 6 from file: 349) Links

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01225292

CERVICAL INTERVERTEBRAL PROSTHESIS

PROTHESE INTERVERTEBRALE CERVICALE

ZERVIKALE ZWISCHENWIRBELPROTHESE

CERVICAL INTERVERTEBRAL PROSTHESIS

Patent Applicant/Patent Assignee:

- **CERVITECH INC**; 300 Roundhill Drive, Rockaway, NJ 07866
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- **KELLER Arnold**;
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Patent Applicant/Inventor:

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- GLAWE DELFS MOLL(agent)
Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200532431	A1	20050414
Application	WO	2004EP9089		20040813
Priorities	US	2003690848		20031002

34/5K/34 (Item 7 from file: 349) [Links](#)

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01211360

INTERVERTEBRAL DISK PROSTHESIS
PROTHESE DE DISQUE INTERVERTEBRAL
BANDSCHEIBENPROTHESE
INTERVERTEBRAL DISK PROSTHESIS

Patent Applicant/Patent Assignee:

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Patent Applicant/Inventor:

- KELLER Arnold
An der Naherfurth 5, 23863 Kayhude; DE; DE(Residence); DE(Nationality); (Designated only for: US)
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Legal Representative:

- GLAWE DELFS MOLL(agent)
Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200518508	A1	20050303
Application	WO	2004EP6484		20040616
Priorities	EP	200316441		20030721

34/5K/35 (Item 8 from file: 349) [Links](#)

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01199970

HIP PROSTHESIS PROVIDED WITH A SHAFT INSERTED INTO THE FEMUR

PROTHESE DE HANCHE COMPRENANT UNE TIGE A INSERER DANS L'OS DE LA CUISSE

HUFTPROTHESE MIT EINEM IN DEN OBERSCHENKELKNOCHEN EINZUSETZENDEN SCHAFT

HIP PROSTHESIS PROVIDED WITH A SHAFT INSERTED INTO THE FEMUR

Patent Applicant/Patent Assignee:

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- KELLER Arnold; An der Naherfurth 5, 23863 Kayhude
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Patent Applicant/Inventor:

- KELLER Arnold
An der Naherfurth 5, 23863 Kayhude; DE; DE(Residence); DE(Nationality); (Designated only for: US)
- KELLER Arnold
;;;;

Legal Representative:

- GLAWE DELFS MOLL(agent)
Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200507039	A1	20050127
Application	WO	2004EP6485		20040616
Priorities	EP	200316157		20030716

34/5K/36 (Item 9 from file: 349) [Links](#)

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01167427

PROSTHETIC JOINT OF CERVICAL INTERVERTEBRAL DISCS
PROTHESE ARTICULAIRE DE DISQUE INTERVERTEBRAL CERVICAL
ZERVIKALE BANDSCHEIBEN-GELENKPROTHESE
PROSTHETIC JOINT OF CERVICAL INTERVERTEBRAL DISCS

Patent Applicant/Patent Assignee:

- CERVITECH INC; 300 Roundhill Drive, Rockaway, NJ 07866
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(Designated only for: US)
- KELLER Arnold; An der Naherfurth 5, 23863 Kayhude
DE; DE(Residence); DE(Nationality)
(Designated only for: US)
- MCAFEE Paul C; Scoliosis and Spine Center, 7505 Osler Drive, Suite 104, Baltimore, MD 21204
US; US(Residence); US(Nationality)
(Designated only for: US)
- ...Designated only for: US);
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- KELLER Arnold;
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Patent Applicant/Inventor:

- LINK Helmut D
Wildstieg 14, 22397 Hamburg; DE; DE(Residence); DE(Nationality); (Designated only for: US)
- KELLER Arnold
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Scoliosis and Spine Center, 7505 Osler Drive, Suite 104, Baltimore, MD 21204; US; US(Residence);
US(Nationality); (Designated only for: US)
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- KELLER Arnold
;;;;

Legal Representative:

- GLAWE DELFS MOLL(agent)

Patent- und Rechtsanwälte, Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200489259	A1	20041021
Application	WO	2004EP1498		20040217
Priorities	EP	20038127		20030407

34/5K/37 (Item 10 from file: 349) [Links](#)

PCT FULLTEXT

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01167418

PROSTHETIC JOINT OF CERVICAL INTERVERTEBRAL FOR A CERVICAL SPINE

PROTHESE ARTICULAIRE INTERVERTEBRALE POUR LA COLONNE CERVICALE

ZWISCHENWIRBEL-GELENKPROTHESE FUR DIE HALSWIRBELSAULE

PROSTHETIC JOINT OF CERVICAL INTERVERTEBRAL FOR A CERVICAL SPINE

Patent Applicant/Patent Assignee:

- **CERVITECH INC**; 300 Roundhill Drive, Rockaway, NJ 07866
US; US(Residence); US(Nationality)
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(Designated only for: US)
- **KELLER Arnold**; An der Naherfurth 5, 23863 Kayhude
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Patent Applicant/Inventor:

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- GLAWE DELFS MOLL(agent)
Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200489258	A1	20041021
Application	WO	2004EP1029		20040204
Priorities	EP	20038127		20030407

34/5K/38 (Item 11 from file: 349) Links

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01113121

SYSTEM OF INTERVERTEBRAL PROSTHESES

SYSTEME DE PROTHESES INTRA-VERTEBRALES

SYSTEM VON ZWISCHENWIRBELPROTHESEN

SYSTEM OF INTERVERTEBRAL PROSTHESES

Patent Applicant/Patent Assignee:

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- **KELLER Arnold;**
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Patent Applicant/Inventor:

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Legal Representative:

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Patent- und Rechtsanwälte, Rothenbaumchaussee 58, 20148 Hamburg; DE;

	Country	Number	Kind	Date
Patent	WO	200434935	A1	20040429
Application	WO	2003EP2555		20030312
Priorities	DE	10247762		20021014
	WO	2003EP372		20030115
	US	2003358387		20030205

34/5K/39 (Item 12 from file: 349) Links

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01113118

INTERVERTEBRAL PROSTHESIS

PROTHESE INTERVERTEBRALE

ZWISCHENWIRBELPROTHESE

INTERVERTEBRAL PROSTHESIS

Patent Applicant/Patent Assignee:

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Legal Representative:

- GLAWE DELFS MOLL(agent)
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	Country	Number	Kind	Date
Patent	WO	200434936	A1	20040429
Application	WO	2003EP372		20030115
Priorities	DE	10247762		20021014

34/5K/40 (Item 13 from file: 349) [Links](#)

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01090862

KNEE PROSTHESIS

PROTHESE DU GENOU

KNIEPROTHESE

KNEE PROSTHESIS

Patent Applicant/Patent Assignee:

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Patent Applicant/Inventor:

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	Country	Number	Kind	Date
Patent	WO	200412633	A1	20040212
Application	WO	2003EP8196		20030725
Priorities	EP	200216768		20020726

34/5K/41 (Item 14 from file: 349) Links

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00972430

COUPLED KNEE PROSTHESIS WITH A ROTATIONAL BEARING

PROTHESE DE GENOU COUPLEE ET PALIER DE ROTATION

GEKOPPELTE KNIETPROTHESE MIT ROTATIONSLAGER

COUPLED KNEE PROSTHESIS WITH A ROTATIONAL BEARING

Patent Applicant/Patent Assignee:

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	Country	Number	Kind	Date
Patent	WO	200302039	A2-A3	20030109
Application	WO	2002EP6900		20020621
Priorities	EP	2001115511		20010627

34/5K/42 (Item 15 from file: 349) Links

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KNEE PROSTHESIS WITH A FLEXION HINGE

PROTHESE DU GENOU POURVUE D'UNE CHARNIERE DE FLEXION

KNIEPROTHESE MIT EINEM BEUGESCHARNIER

KNEE PROSTHESIS WITH A FLEXION HINGE

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	Country	Number	Kind	Date
Patent	WO	200285257	A2-A3	20021031
Application	WO	2002EP4156		20020415
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